THE RELATIONSHIPS AMONG MATERNAL VARIABLES AND THE INTELLECTUAL ABILITY AND SOCIAL/EMOTIONAL STATUS OF PREMATURELY BORN CHILDREN

BY

LINDA K. MORRIN

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To my love, Ken, for kindness, understanding, love, and patience,

and

To the mothers and their children about whom this dissertation is written.

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THE RELATIONSHIPS AMONG MATERNAL VARIABLES AND
THE INTELLECTUAL ABILITY AND SOCIAL/EMOTIONAL
STATUS OF PREMATURELY BORN CHILDREN

By

Linda K. Morrin

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This study was designed to investigate the relationships among maternal variables and the intellectual ability and social/emotional status of very low birthweight (VLBW), prematurely born children. Thirty randomly selected children who were born weighing less than 1500 grams and their mothers were studied. Eleven male and 19 female children participated. Sixteen children were white and 14 were black.

Mothers completed the Tennessee Self-Concept Scale, the Adult Nowicki-Strickland Internal-External Scale, and the Parent Perception Profile (designed by the researcher). Children completed a Human Figure Drawing, the Primary Self-Concept Inventory, and the Preschool

and Primary Nowicki-Strickland Internal-External Scale. Medical and developmental records were also consulted.

Significant relationships were found between mothers' and their children's locus of control, but not between mothers' and their children's self-esteem. Variables that correlated significantly with children's intellectual ability and social/emotional status included mothers' income, locus of control, and perceptions of children's intellectual ability and social/emotional status. Mothers' income and perceptions of children's present intellectual ability predicted children's Stanford-Binet IQs. Mothers' perceptions of children's future intellectual ability and social/emotional status predicted actual social/emotional status. Neonatal risk factors did not correlate significantly with children's intellectual ability or social/emotional status.

In general, significant relationships were found between mothers' perceptions of their children's ability and their children's actual ability. Mothers' perceptions of their children's intellectual ability became more positive as the children grew older while perceptions of social/emotional status remained stable. This suggested that mothers initially feared more for their children's intellectual ability than social/emotional status.

CHAPTER I
INTRODUCTION

School psychologists are being called upon today to work in expanding roles with increasingly diverse populations in a wide variety of settings. A recent publication of the National Association of School Psychology (NASP, 1983) succinctly answers questions central to an understanding of modern school psychology: (a) What is it? (b) Who do school psychologists serve? (c) Where do they practice? Briefly, the NASP responses were

> (a) School psychology is a specific specialty within the profession of psychology which focuses upon the psycho-educational development of individuals, their abilities and potentialitites, and the emotional and cultural factors which influence this learning process.
>
> (b) While particular attention has traditionally focused upon the emotional, social, and educational needs of youth, the unique interrelationships between children and their parents, teachers, and school administration has necessitated that school psychologists frequently provide direct assistance to all members of a family and the school.
>
> (c) While many school psychologists practice in educational institutions including public and private schools, nursery and day care schools, colleges and universities, others work in rehabilitation centers, hospitals, mental health clinics, government agencies at the state and federal level, child guidance centers, penal institutions, and behavioral research laboratories. (NASP, 1983, p. 1)

The expanding breadth of the profession of school psychology has encouraged school psychologists to subspecialize and to focus their attentions on specific service-recipient populations. One such population now receiving increasing attention by school psychologists is that of high-risk, prematurely born children and their parents. As Friedman and Sigman (1981) stated

> preterm infants are at high risk for developmental deficits that may result from somatic, psychological, and social causes, or, as is usually the case, from a combination of them. (p. xv)

Therefore, school psychologists are among the professionals of choice to assist in minimizing the effects of negative psychological and social consequences in turn affecting the learning potentials of these children. Yet, there remains much to be learned about psychological factors relating to the development of preterm children before effective intervention can be planned and implemented by school psychologists and other professionals.

Overview

It is known that, as a group, very low birthweight (VLBW), premature babies weighing less than 1500 grams (approximately 3 1/2 pounds) at birth are at "high-risk" for developmental difficulties (Friedman & Sigman, 1981). The difficulties usually begin at birth.

At the time of birth, neonatologists attempt to cope with the medical emergencies of the very low birthweight, premature child while the families attempt to cope with associated emotional issues. Typically, parents feel they have been "robbed" of their expectations for the perfect, healthy child. Friedman and Sigman (1981) affirmed that

> a normal, uneventful pregnancy and a healthy robust, normal newborn are the desires of every expectant parent. Today's communications media and product advertisements reinforce this expectation with photographs of chubby, rosy-cheeked infants. (p. 17)

This image, however, is shattered for parents of preterm children and they must immediately adjust to their tiny, immature infants and to the frightening experience of the "high tech" hospital intensive care unit. Such parents naturally fear for their newborn's chances for survival and normal development. They may wonder what they did to "cause" the early birth.

The birth experience becomes even more difficult emotionally, physically, and financially because many prematurely born infants must be separated from their families for substantial lengths of time in order to be stabilized medically. For example, a very low birthweight (VLBW) preterm child may spend months in a neonatal intensive care unit. Parents of such children may have daily contact with their children, but contact is

extremely limited and usually through an isolette (i.e., infant incubator). Unfortunately, medical threats to the infant's survival and limited contact are potentially harmful to the formation of a physically and psychologically healthy initial relationship between parent and child (Klaus & Kennell, 1982).

Parental reactions to premature births have been most clearly documented for the period beginning with the birth and ending with the hospital discharge. Reactions including guilt, fear, and depression are common and many tertiary care centers, i.e., major hospitals equipped to care for the most severely ill patients, employ staff psychologists, infant development specialists, or social workers to assist parents with their concerns during the period between birth and hospital discharge.

Friedman and Sigman (1981) cautioned that

> when the period of separation is over, the question of whether the early insult and complications have limited the infant's physical, neurological, and psychological development becomes critical. (p. xv)

On an individual basis, developmental outcomes are difficult to predict for VLBW children. For example, different babies, who collectively have suffered nearly every medical complication associated with prematurity, sometimes grow up with little or no evidence of their early misfortunes. Yet, many others experience long-term problems.

Marton, Minde, and Ogilvie (1981) asserted that three major clusters of factors contribute to the premature child's development: those of the parents, the infant, and the medical intervention during the neonatal period. Long term follow-up has most often focused on the relationships among the infant's medical complications, medical interventions, and the infant's medical and intellectual outcomes. Comparatively little attention has been paid to relationships among parental variables and child outcomes. It is important to note that medical risk factors alone do not explain the variations in developmental outcomes for children who were born prematurely. Social factors, including maternal variables, probably account for some of the differences in individual children's developmental outcomes.

Contextual Background

Within the general newborn population in the United States, the incidence of premature births is extremely high. A low birthweight baby is born every 48 minutes (Developmental Disabilities Planning Council, 1985). Further, as many as 10% (i.e., 250,000 to 300,000) of the babies born in the U.S. each year are born prematurely (Harrison, 1983).

As preterm children approach school age and/or encounter learning or adjustment difficulties, school psychologists are frequently called upon to assess their

intellectual and social/emotional functioning. Harbaugh (1983) reported that 49% of the students enrolled in special education programs in Florida were born prematurely. Thus, nearly half of the 145,379 children enrolled in Florida's special education programs, excluding gifted classes, during the 1983-1984 academic year were born prematurely (State of Florida, Department of Education, 1984). Knowledge of the child's medical history as well as an understanding of mothers' perceptions of the child is necessary for adequate and effective psychoeducational assessment and intervention.

Theoretical Framework

The theoretical framework for this study is derived primarily from social learning theory. Bandura's (1977) explanation of how children model their parents and as a result take on the characteristics and internalize the beliefs of their parents is important to an understanding of mother-child relationships. Factors such as mothers' self-esteem, locus of control, and perceptions of the child's abilities may be transmitted to the child. For example, a mother who models an internal locus of control by taking an active role in determining her life's outcomes will presumably teach her child to feel control over his or her life. Thus, social learning theory explains the importance of maternal modelling for child development.

Statement of the Problem

Psychological and social factors related to the development of children born prematurely are not clearly understood. Specifically, the relationships among preterm children's intellectual ability and social/emotional status and maternal variables such as income, self-esteem, locus of control, and perceptions of the child's intellectual ability and social/emotional status were not known. The relationships among these child and maternal variables were investigated in this study.

Further, the relative contributions of the above mentioned maternal variables to child intellectual and social/emotional developmental outcomes were not known. These relationships were also investigated in this study.

Need for the Study

For school psychologists assessing the developmental progress of VLBW, high-risk children and attempting to assist parents through counseling, training, or other interventions, it is desirable to increase the knowledge base surrounding developmental outcomes of preterm children. Friedman and Sigman (1981) emphasized that

> only when we have identified the behavioral systems altered by preterm birth and the mechanisms that mediate or ameliorate the effects of preterm birth will we be ready to recommend effective psychological interventions for preterm infants. (p. xxvii)

Maternal influences in this complex system of variables relating to the developmental outcomes of prematurely born children were studied.

There were many reasons to look to the mothers of high-risk children to understand the children's later development. For example, mothers generally care for their children on a daily basis and are among the primary agents of enculturation for their children. Children observe and model their mothers. Also, to some extent, children assimilate the attitudes and perceptions of their mothers (Bandura, 1977).

An understanding of parental response to a child's early birth has implications for the child's developmental outcomes. To illustrate, Klaus and Kennell (1976) stated that

> some early events have long-lasting effects. Anxieties about the well-being of a baby with a temporary disorder in the first day may result in long-lasting concerns that may cast shadows and adversely shape the development of the child. (p. 14)

Self-esteem was selected as one of the primary maternal variables to be investigated in this study because it is considered a strong potential influence on the child. For example, Schneider (1983) explained that

> the self-esteem of children is partially shaped by the self-esteem of their parents. Children develop self-esteem in the reciprocity of the parent-child dyad, through identification with their parents and by how

> they experience subjectively their parents' views of them. (p. 270)

Schneider (1983) added that parents of emotionally disturbed and learning disabled children are particularly vulnerable to lowered self-esteem. Seligman (1983) concurred with this position and stated that

> for many parents children are a significant source of fulfillment and self-esteem, but when the child clearly cannot live up to the parents' hopes and expectations, self-esteem suffers. (p. 135)

Therefore, it is entirely possible that mothers of VLBW premature babies also suffer from lower levels of self-esteem. Lowered parental self-esteem may have a negative effect on parental perception of the child. Mack and Ablon (1983) noted that

> negative appraisals not only reduce the pleasures of the present but they also subvert or eliminate realistic hopes for the future. The corrosive drizzle of negative appraisal presumably removes the joy of today and anticipation of tomorrow. (p. 273)

Negative appraisals interfere with effective parent-child interactions. For example, Schneider (1983) stated that "in both parents and children, diminished self-esteem produces the need to provoke and retaliate" (p. 272).

Very low birthweight premature babies may foster negative external appraisals, which in turn may affect maternal self-esteem. To illustrate, suppose the mother of an 8-month old prematurely born child is at the grocery

store with her child. Well-meaning shoppers comment on the baby and ask the mother the child's age. The mother knows that her baby is developmentally similar to a younger child, both physically and intellectually. The mother may choose the child's chronological age, an adjusted age to correct for prematurity, or, in response to the shopper's question, she may offer an explanation of why her child seems younger. The answer given and the feelings experienced will likely depend upon her concern for negative societal appraisal. This example illustrates Schneider's (1983) statement that "for some individuals self-esteem depends more on external rather than internal variables, or social comparisons" (p. 273).

Related to this, locus of control, another primary variable investigated in this study, refers to the degree events are attributed to either external (i.e., societal) or internal (i.e., personal perception) factors, and the degree to which control or helplessness is perceived (Lefcourt, 1981). Stevenson (1982) stated that

> the construct of locus of control is based on social learning theory and is considered to be a generalized expectancy which operates across a large number of situations regarding the nature of the causal relationship between one's behavior and its consequences. (p. 38)

An understanding of locus of control in parents of preterm children may provide additional insight into children's developmental outcomes. This is particularly true for

"preventive" concerns. In Florida, for example, as many as 50% of the evident childhood handicaps could have been prevented (Developmental Disabilities Planning Council, 1985). Means for preventing handicaps include improved education, family planning, genetic services, and risk analysis, as well as overall prenatal care. Parents are further responsible for assuring that health care, medical and developmental screening, early childhood intervention, and accident prevention occur. Maternal locus of control and emotional response to the child influence the ways mothers care for their children.

For a child who is already at risk, complete medical and developmental follow-up is essential. Parents can either actively seek resources and necessary services for their children, or they can fail to initiate action on their children's behalfs. Parents who attribute their child's outcome primarily to their actions taken on the child's behalf (illustrating an internal locus of control) may be more likely to intervene for their child. On the other hand, parents who attribute their child's outcome to forces beyond their control (illustrating an external locus of control) may be less likely to intervene (Lefcourt, 1981).

It is also likely that parents who demonstrate an internal locus of control will transmit this attitude to their children. Children who see their parents as

controlled internally may learn to see themselves as controlled internally. Lefcourt has noted that children who are internally controlled are typically more independent, that internal control in children has been found to be related to "a warm, positive parental cluster of persona ity attributes" (p. 35), and that internal control is related to increased achievement (Lefcourt, 1983).

If mothers' perceptions of their prematurely born children, self-esteem, and/or sense of control in their children's lives are, in fact, related to preterm children's intellectual and social/emotional functioning, then certain psychological variables related to preterm children's development will have been identified. Emphasizing Friedman and Sigman's (1981) position, this will assist school psychologists in recommending effective psychological interventions for children born prematurely.

Purpose of the Study

This investigation was designed to study the perceptions, self-esteem, and locus of control of mothers of very low birthweight, prematurely born children and to study the children's locus of control, self-esteem, intellectual ability, and social/emotional status. The relationships between these parent and child variables were investigated. Finally, the relative contributions of maternal variables including income, self-esteem, locus

of control, and perceptions of the child's intellectual ability and social/emotional status to the child's intellectual ability and social/emotional status were studied.

Rationale for the Methodology

A sample of 30 primary school age children (i.e., ages 5 - 7) who were born prematurely and at very low birthweight and their mothers were studied. All families had been involved with the Florida Regional Perinatal Follow-Up Program, HRS District III, Florida.

Structured interviews were conducted in the mothers' homes. The interviews were designed to collect information about mothers' perceptions of their children's intellectual and social/emotional development.

The interviews were conducted in the respondents' homes for two reasons. First, mothers were presumably more comfortable at home, which facilitated the establishment of rapport, and thereby eased some of the difficulty they may have had about talking to a "stranger." Interviews were conducted in the evening or during the weekend at a time convenient for the mothers. Data were also gathered from the child in the home.

Second, consistent with Florida state statistics, many families seen for this research were of lower socioeconomic status. With this in mind, an important reason for home-based interviews was to avoid the

hardships associated with arranging transportation and travel expenses. Thus, home interviews helped to insure that an adequate number of mothers and children participated in the study.

In addition to the interview, standardized measures were also employed. These included measures of maternal self-esteem and locus of control. Measures of self-esteem and locus of control were also collected from the children. Finally, data on file in hospital and developmental records about the children's birth complications and current intellectual ability and social/emotional status were used in this investigation.

Hypotheses

The intention of this study was to investigate the relationships between maternal variables and the intellectual ability and social/emotional status of prematurely born children. The following hypotheses, stated in the null form, were tested.

$H_0 1$. There is no relationship between mothers' self-esteem and their prematurely born children's self-esteem.

$H_0 2$. There is no relationship between mothers' self-esteem and their prematurely born children's intellectual ability.

$H_0 3$. There is no relationship between mothers' self-esteem and their prematurely born children's social/emotional status.

$H_0 4$. There is no relationship between mothers' locus of control and their prematurely born children's locus of control.

$H_0 5$. There is no relationship between mothers' locus of control ana their prematurely born children's intellectual ability.

$H_0 6$. There is no relationship between mothers' locus of control and their prematurely born children's social/emotional status.

$H_0 7$. There is no relationship between mothers' perceptions of their children's intellectual ability and their prematurely born children's actual intellectual ability.

$H_0 8$. There is no relationship between mothers' perceptions of their children's intellectual ability and their prematurely born children's social/emotional status.

$H_0 9$. There is no relationship between mothers' perceptions of their children's social/emotional status and their prematurely born children's intellectual ability.

$H_0 10$. There is no relationship between mothers' perceptions of their children's social/emotional

status and their prematurely born children's actual social/emotional status.

$H_0 11$. There is no relationship between mothers' income level and their prematurely born children's intellectual ability.

$H_0 12$. There is no relationship between mothers' income level and their prematurely born children's social/emotional status.

$H_0 13$. There is no relationship between prematurely born children's intellectual ability and maternal variables (income level, self-esteem, locus of control, and perceptions of the child's intellectual ability and social/emotional status) when neonatal risk factors are included.

$H_0 14$. There is no relationship between the prematurely born child's social/emotional status and maternal variables (income, self-esteem, locus of control, and perceptions of the child's intellectual ability and social/emotional status) when neonatal risk factors are included.

The .10 level of significance was the minimum used to reject null hypotheses.

Definitions of Terms

For the purposes of this study, the following specific definitions were used.

Birthweight (BW). The weight of an infant at birth is the infant's birthweight. This weight will be given in grams.

Gestational age (GA). The age of the child from conception to birth is the child's gestational age. This age was calculated by Dubowitz exam and is given in weeks.

High risk infant. For purposes of this study, a high risk infant was a prematurely born child who weighed 1500 grams or less at birth.

HMD. (Hyaline Membrane Disease or Respiratory Distress Syndrome) "Respiratory distress that affects premature babies. It is caused by a lack of surfactant, the substance that keeps the lungs' air sacs from collapsing" (Harrison, 1983, p. 257).

Intellectual ability. A child's measured potential to learn was considered the child's intellectual ability. This was described via Stanford-Binet Intelligence Scale intelligence quotients and Human Figure Drawing mental ages.

Locus of control. Locus of control refers to the degree to which outcome or performance is attributed to internal or external (societal) influences. This was measured via the Adult Nowicki-Strickland Internal-External Control Scale and the Preschool and Primary Nowicki-Strickland Internal-External Control Scale.

Low birthweight (LBW). Low birthweight refers to a weight of less than 2500 grams (approximately 5 1/2 pounds) at birth.

Neonatal Intensive Care Unit (NICU). A medical intensive care unit designed to care for seriously ill newborn infants.

Neonatologist. A neonatologist is a medical doctor specializing in the care of newborn infants.

Neonatal risk factors. Hoebel's neonatal screening instrument was used to assess children's risk factors at birth. This instrument included general factors and factors associated with respiratory, metabolic, cardiac, hematologic, and central nervous system functioning.

Perinatal. Perinatal refers to the time surrounding birth.

Premature. An infant born before a normal length of gestation is completed is premature. An infant is considered premature if born before 37 weeks gestation have been completed.

Respiratory Distress Syndrome (RDS). RDS refers to the inability of a premature infant to produce enough surfactant to keep the lungs expanded as the infant breathes (Harrison, 1983)

Self-esteem. Self-esteem refers to a subjective value judgment that the individual makes about him or herself (Demos, 1983). This was measured by the

Tennessee Self-Concept Scale and the Primary Self-Concept Scale.

Social/emotional status. This was described via the results of a human figure drawing (Koppitz scoring), and a "normal," "at risk," or "abnormal" social/emotional assessment made by a psychologist specializing in the evaluation of young children.

Very low birthweight (VLBW). Very low birthweight refers to a weight of less than 1500 grams (approximately 3 1/2 pounds) at birth.

Overview of the Remainder of the Dissertation

The remainder of this dissertation is presented in four sections. Chapter II provides a review of the related literature. Chapter III provides a detailed description of the methodology, including a delineation of the relevant variables, population and sampling information, and a description of the data analysis procedures. Chapter IV provides the results from the data analyses conducted. The final chapter includes conclusions and interpretations, implications and recommendations, and discussion.

CHAPTER II
REVIEW OF THE RELATED RESEARCH

This dissertation was designed to investigate the relationships between maternal variables and the later development of prematurely born children who were placed in a Neonatal Intensive Care Unit (NICU) at birth. The relevant research is reviewed in this chapter. The major areas covered are (a) developmental outcomes of premature infants, (b) problems associated with early parent/infant separation, (c) parental adjustment to and interactions with preterm children, and (d) the role of self-esteem and locus of control.

Developmental Outcomes of Premature Infants

In this section, mortality and survival rates and educational and cognitive development of prematurely born children are discussed. In addition, sensory processing and behavior in preterm infants, as well as intervention strategies with preterm children, are reviewed.

Mortality and Survival Rates

Central to a discussion of developmental outcome of prematurely born children is the issue of infant mortality. Miller (1985) provided an insightful

discussion into the causes and rates of infant mortality. Relevant findings focus on the sharp decline of overall infant mortality rates in the U.S. and the social factors associated with rates of decline. While the decline in U.S. infant mortality has abruptly slowed, coinciding with cutbacks in programs for mothers and children, Miller (1985) reported that the U.S. mortality rate has declined from 124 per 1000 live births in 1910 to 47 in 1940, 13.1 in 1979, 10.9 in 1983, and finally, to 10.6 deaths per 1000 live births in 1984. Factors associated with the declining infant mortality rates include the expansion of social support programs, improved maternity-related services, access to family planning and abortion services, and the development of nutritional supplements for pregnant women. In addition, this sharp decline is due to "dramatic advances in medical technology for the care and improved survival of infants born at extremely low weight" (p. 34). Miller further stated that

> the strongest influence in reducing infant mortality in recent years has been the growth of programs for care of newborn babies who are at high risk of death. Some 600 hospitals in the U.S. have established units capable of applying the advanced technology now available. (p. 36)

This decline in the mortality rate raises the question of the quality of life for the surviving infants, particularly for the VLBW infants and their families. While an improved rate of survival and favorable

prognosis for later health and development have been established for babies weighing over 1500 grams at birth, the long-term prospects for babies weighing under 1500 grams are more doubtful (Miller, 1985).

Stewart, Reynolds, and Lipscomb (1981) reviewed 22 reports on developmental outcomes for very low birthweight infants. In their review, they included only those reports for which results of all live births in the population were noted. All reports came from developed countries and included information from units in places such as Florida, Denver, Melbourne (Australia), Lausanne, Rome, Edinburgh, and London. Data from 1946 to 1977 were reviewed. The authors described four major phases apparent in the data. The first phase, occurring in the 1940s and early 1950s, was characterized by two major outcomes, either death for ill VLBW babies or intact survival. During this period, over 60% of the VLBW babies died. Those who survived often escaped severe handicap. Much was learned about the normal physiology of VLBW babies during this time.

This increased knowledge served to bring about phase II in the development of perinatal care. During this second phase, attempts were made to treat the derangements that had been found to cause death and disease. Stewart, Reynolds, and Lipscomb (1981) stated that "in a few major centres new methods of treatment were being introduced and mortality rates began to fall,

but sometimes at the expense of an increase in the prevalence of handicap among survivors" (p. 1040). They further stated that the "increased handicap-rate is attributable to inadequate application of new knowledge and to iatrogenic disease" (p. 1040). Phase III, which began in the early 1960s, saw the increased survival of VLBW infants, while the incidence of serious handicap remained stable at a low 6 to 8%. During this phase, treatments associated with handicaps were carefully monitored, and increased sophistication and application of obstetric and neonatal care resulted in increased survival rates without increased incidence of handicap. The authors contended that perinatal care of VLBW babies was entering a new, fourth phase of more accurate prediction of outcome. This phase has serious ethical implications. It seems likely that it will soon be possible to determine, physiologically, which infants will die or develop serious handicaps. The authors stated that "it should also eventually be possible to identify infants whose brains are so hopelessly damaged that the withholding of intensive care can, if the parents wish it, be ethically considered" (p. 1040).

Many of the following studies report both survival statistics and data gathered about the small groups of survivors. Studies that provide detailed information about numbers of survivors and causes of death are reviewed in this section.

Researchers at the University of Washington at Seattle (Alden, Mandelkorn, Woodrum, Wennberg, Parks, & Hodson, 1972) studied a group of 161 infants who were born weighing 1000 grams or less. All infants were born between January 1, 1965, and January 1, 1970. This investigation revealed a very low survival rate; 87% of the babies died. Mortality rate was increased if initial hematocrit was less than 40%, if blood pressure was low, if Apgar scores were low, if hyaline membrane disease (HMD) was present, or if assisted ventilation was required. Autopsies revealed that 48% had hyaline membrane disease, 48% had CNS hemorrhages (several also had HMD), 3% had necrotizing enterocolitis, and 3% had kernicterus. The median age at death was 25 hours. Of the 161 infants born under 1000 grams, only 22 survived the neonatal period (i.e., the first 28 days of life). Twelve surviving children had normal developmental quotients (i.e., 90 or above) at 10 or 15 months of age, although one had speech problems, one had a hearing loss, two had retrolental fibroplasia, and one had spasticity of the lower extremities. Thus, only 9 of 161 infants had completely "normal" development. Six infants had borderline developmental quotients (i.e., 70 through 89), and two infants had abnormal developmental quotients (i.e., 69 and below). All reported developmental quotients were adjusted for prematurity.

Britton, Chir, Fitzhardinge, and Ashby (1981) reported on the survival of infants weighing less than 801 grams at birth. They studied a group of 158 infants born between January 1974 and December 1977. All infants were transported to the NICU at Toronto's Hospital for Sick Children. The median age at admission was 2 to 3 hours. One hundred nineteen, or 75%, of the infants died. Autopsies were performed on 71 (60%) of the deceased. Forty-nine percent of the deaths occurred on day one and 87% within the first week. Major causes of death were consistent with other reports: intracranial hemorrhages (39), respiratory distress syndrome (RDS) (26), and infection (13). Thirty-nine of the 158 babies survived the neonatal period. One baby died of meningitis and pneumonia at an adjusted chronological age of 9 weeks and no follow-up data were available for one girl. Developmental results were reported for the 37 survivors. These children were seen at 3, 6, 9, 12, and 18 months adjusted ages. Physical and full neurodevelopmental evaluations were conducted. The 18-month Bayley Scales of Infant Development scores were reported. The following categories were used: (a) children with Bayley scores below 70, or with severe cerebral palsy or hydrocephalus; (b) children with Bayley scores of 70 through 84, or with mild cerebral palsy or seizure disorders; and (c) survivors with Bayley scores greater than 84 and no evidence of

cerebral palsy or hydocephalus. Nineteen children of the total 158 had Bayley scores higher than 84 and no other defect. Ten children were considered moderately handicapped, and eight children were severely handicapped. The authors also found that no infants born weighing less than 500 grams survived. Eight of those infants weighing between 700 and 800 grams survived. The authors concluded that intensive care was not justified for infants born weighing less than 700 grams at birth. They felt it was justified for infants with birthweights of 700 grams or greater based on their review of infants born through 1977.

Fitzhardinge and Ramsay (1973) studied 111 children who were born in Montreal's Royal Victoria Hospital between 1960 and 1966. All children weighed 1250 grams or less at birth. Of the 111 infants, 79 died in the neonatal period. One infant died at 3 months of bronchiolitis, four were adopted, and two were not able to be followed due to distant geographical moves. The remaining 32 children (20 boys and 12 girls) were tested at 4, 6, and 8 years of age. The Stanford-Binet Intelligence Scale was administered to the youngest children and the Wechsler Preschool and Primary Scales of Intelligence (WPPSI) and the Wechsler Intelligence Scale for Children (WISC) were administered to the older children. Full scale scores were reported. Reports of school performance were also obtained from parents and

teachers. The authors concluded that 10 of the 32 surviving children had normal growth and development. Twenty-four had normal vision, 1 child had a mild conductive hearing loss, 13 children had some sort of speech defect, 1 had spastic diplegia, and 1 child had repeated convulsions. They reported that 13 children had IQs less than 90 and one had an IQ greater than 120. Also, they found that 13 children were doing satisfactory work in school, 8 were failing or were in special classes, and 2 boys were in special schools. In summary, only 10 of the 111 children studied were reported to be developing normally.

Hommers and Kendall (1976) followed 103 infants born in 1973 (N=59) and 1974 (N=44). All babies were born in Coventry Maternity Hospital and weighed 1500 grams or less at birth. Twenty-six of the 53 boys and 21 of the 50 girls survived the neonatal period. Twenty-two infants were small for gestational age (SGA). None of the infants born weighing 500 grams or less lived. Eight of those born between 501 and 1000 grams survived, and 39 of those between 1001 and 1500 grams survived. Autopsies were performed for 22 of those who did not survive. Similar to other reports, causes of death included hyaline membrane disease (7), intracranial hemorrhage (6), neonatal asphyxia (3), extreme prematurity (3), congenital rubella (1), pulmonary hemorrhage (1), and torn umbilical cord (1).

Four other children died in infancy. Forty-two of the 43 survivors were followed (one child moved to India). Adjusted ages at the time of testing ranged from 7 to 28 months. A profile based on the Birmingham Developmental Chart was used to assess the infants. Developmental quotients ranging from 77 to 120 were reported. Frequencies were as follows: 71 through 80 (2 children); 81 through 90 (3 children); 91 through 100 (14 children); 101 through 110 (16 children); and 111 through 120 (7 children). The authors reported no handicapping conditions among the survivors, although they mentioned one child with a mild hemiparesis.

Resnick, Eitzman, Dickman, Ariet, and Ausbon (1983) reported the survival data from the Florida Regional Perinatal Intensive Care Centers Program (RPICC). Medical and demographic data for 21,364 newborns who received neonatal intensive care services in Florida were reported for the years 1977 to 1982. They found that 18% of the infants with birthweights of 500 through 750 grams survived. Fifty percent of those weighing 751 through 1000 grams survived, as did 83% born weighing 1001 through 1500 grams, and 94% born at over 1500 grams.

These studies all attest to the precarious position of the premature newborn. While more babies are surviving early births, and fewer are likely to suffer

severe sequelae, the birth of a very low birthweight premature infant is still cause for much concern.

Educational and Cognitive Development

As Friedman and Sigman (1981) noted, quality of life depends partially on adequate cognitive development. In this section, studies concerned primarily with learning and cognitive development and its prediction for the preterm child are reviewed.

Gegoski, Fagen, and Pearlman (1984) utilized a conjugate reinforcement task to assess learning and retention differences between full-term and preterm infants. The researchers trained 10 preterm and 10 full-term caucasian infants (7 males and 3 females for each group) of unknown age to kick a mobile suspended from their cribs. Training consisted of three 12-minute sessions of reinforced practice followed by three minutes of nonreinforcement sessions. Only right footkicks were counted. These researchers reported that full-term babies required less time to learn the footkicking response and that only the full-term babies showed evidence of one week retention.

Wiener (1968) reported the results of a major long-term, follow-up study of premature infants and controls born in Maryland in 1952. Nine hundred ninety-two infants were followed for 12 years and those available for follow-up were periodically assessed using

the Stanford-Binet Intelligence Test (Form L-M), the Lincoln Oseretsky Test of Motor Development, the Goodenough Draw-a-Person Test, and the Bender Gestalt Test of Visual-Motor Coordination. A primary purpose of the study was to determine if preterm children would "catch up" with full-term children in their developments. Wiener reported that by the time of the third testing, ages 3 through 5, catching up had not occurred. WISC scores at ages 8 through 10 remained significantly different from those of full-term controls. Wiener also reported that chilaren of lower classes were not relatively more impaired as a function of birthweight. A total of 848 children remained in the follow-up groups at age 12 through 13 (these data were collected in the spring of 1965). Relatively more preterm children were in lower grades or in special classes at this time compared to control subjects. Overall findings indicated that birthweight was significantly associated with developmental outcome and that differences remained between VLBW and control subjects at ages 12 and 13.

Holstrum (1979) also attempted to determine if low birthweight premature infants catch up to full-term infants. She studied 102 3-year-olds, half of whom had been placed in a neonatal intensive care unit and half who were taken to the regular newborn nursery at birth.

Subjects were born between September 1975 and March 1976. Tests consisted of the Stanford-Binet Intelligence Scale (Form L-M), and the Carrow Test for Auditory Comprehension of Language, in addition to a stressful life events scale and a behavioral interview. Birthweight, socioeconomic status, and neonatal complications best predicted 3-year status and mothers who experienced the most stress perceived their infants as having behavior problems. Infants at the highest risk tended to have lower IQs and poorer visual-motor skills, although results indicated no statistically significant differences between term and preterm groups.

In a study by Landry, Fletcher, Zarling, Chapieski, Francis, and Denson (1984), 126 neonates under 1501 grams were followed for two years after birth. The purpose of this study was to investigate the effects of intraventricular hemorrhages (IVH) which are often associated with premature birth. Five groups of infants were used: (a) IVH (grades I-IV) with respiratory distress syndrome (RDS)--no hydrocephalus (N=29); (b) RDS--no IVH (N=48); (c) Bronchopulmonary displasia (BPD)--no IVH (N=10); (d) BPD--IVH (N=17); and (e) IVH infants who developed progressive hydrocephalus (N=22). All infants were developmentally assessed at 6, 12, and 24 months with the Bayley Scales of Infant Development. Scores adjusted for prematurity and unadjusted scores

were recorded at 6 and 12 months. Only unadjusted scores were recorded at 24 months. Initial results revealed no significant differences between the BPD--IVH groups; therefore, these two groups were combined and results were reported for four groups. At 6 months of age, the RDS--no IVH group performed significantly better than the BPD and HYD groups. At 12 months of age, the RDS--no IVH group had significantly better PDI scores than the HYD group. The effect of length of hospitalization was also investigated. Subjects discharged before 16 weeks typically had average scores and showed improvement over time. Those hospitalized over 16 weeks all had scores below 80 and showed few changes over time.

Siegel (1983) questioned whether preterm infants catch up with term infants in their later development. She also questioned whether scores corrected for prematurity or uncorrected scores were more accurate predictors of subsequent development in preterm infants. To answer these questions, Siegel studied 161 preterm infants and 121 term infants. Children were tested at 4, 8, 12, 24, 36, 48, and 60 months with a battery of age-appropriate tests. After 12 months, uncorrected Bayley scores were better predictors of subsequent scores. Siegel also concluded that at 5 years of age differences between preterm and full-term children were

small and nonsignificant in the area of language. Perceptual-motor scores, however, were significantly lower for prematurely born children.

The Bayley Scales of Infant Development were used by Hunt and Rhodes (1977) to assess the mental development of preterm infants during the first year. Fifty-six infants born at high risk were tested at 2 months adjusted age, each subsequent month until 8 months, and then also at 12 and 24 months adjusted ages. This study differed from many in that testing took place in the infants' homes. The authors speculated that this may have contributed to the high adjusted scores they obtained for their sample. Results supported the use of adjusted age scores and indicated that adjusted test scores were at or above the normal range at 12 and 24 months.

Francis-Williams and Davies (1974) studied the intelligence at ages 4 to 12 years of surviving VLBW children. The children were born in or transferred to Hammersmith Hospital between 1961 and 1968. One hundred five of the 120 were available for testing. Two parents refused, 1 child died at 4 years of age (of causes unrelated to prematurity), 1 was lost to follow-up, and 11 children lived too far away for testing to be arranged. The Wechsler Preschool and Primary Scale of Intelligence (WPPSI) and the Wechsler Intelligence Scale

for Children (WISC) were used as outcome measures of intelligence. Wechsler tests were completed for 101 children. The Neale Analysis of Reading Ability and the Schonell Graded Word Reading Test were also administered for children of reading age, and the Bender Gestalt Test (Koppitz scoring) was administered to children ages 5 and older. Neither birthweight and gestational age, nor neonatal illness correlated significantly with full scale IQ. One fifth of the sample, however, had a performance IQ significantly below the verbal IQ. Of the 65 children given the Bender Test, 36 scored at least one standard deviation below the mean, 14 scored within the normal range, and 15 scored above average. Correlations with social class were highly significant.

Siegel (1981) investigated the prediction of cognitive and language development in 80 preterm and 68 full-term infants at 2 years of age. Infants from Hamilton, Ontario, were administered the Bayley Scales of Infant Development and the Uzgaris-Hunt Scales at 4, 8, 12, 18, and 24 months. The Reynell Developmental Language Scales were administered at 24 months and the Caldwell Inventory of Home Stimulation (HOME) was given at 12 months. Bayley and Uzgaris-Hunt scores were significantly correlated with cognitive and language scores at 2 years of age. Siegel (1981) reported that the predictive pattern of the Bayley scales

> is such that the perceptual-motor items tend to be predictive early, the object relations and similar items become predictive later on, and finally, the language-related items become predictive at 12 and 18 months. (p. 554)

The infant tests, however, accounted for only 50% of the variance in outcome. Results of the HOME scale suggested that environmental factors contributed to the prediction of outcome. For example, infants who were not detected as being at risk early on, but who were delayed at 2 years, came from homes which provided little stimulation. The reverse was also true. Infants who were incorrectly detected as being developmentally delayed came from homes which did provide toys and play materials and from homes in which the mother was responsive to the infant. Siegel reported that this was particularly true for language development. These results suggested that there are mutual influences between a child and the environment.

Cohen and Parmelee (1983) studied the prediction of Stanford-Binet IQ scores for 100 prematurely born, 5-year-old children. Sixty-two children were English speaking, 28 were Spanish speaking, and 10 spoke other languages. Prematurely born children were selected from those who were born between July 1972 and December 1974. Prematurity was defined by a gestational age of 37 weeks or less and a birth weight of 2500 grams or less. Children with obvious anomalies were excluded from the

study. All children were born at or transferred to the University of California Hospital. Medical, neurological, neurophysiological, behavioral, and home factors were assessed in the first year. The children were then studied at 2 years of age and again at 5 years. The 5-year Stanford-Binet IQ was used as an outcome variable. Gestational age, birthweight, and length of hospitalization did not predict IQ at age 5 or at any earlier age. Cohen and Parmelee did find that visual attention (at term) was related to 5-year scores. That is, infants who fixed on visual targets longer were less competent at age 5. Low (90 and below) and high (above 90) IQ scores were predicted from 2-year measures. Social factors were also investigated as predictive variables. The researchers chose years of maternal education and measures of infant-caregiver interactions to analyze the contributions of social factors. They found that maternal education was a significant predictor, yet, caregiver-infant interactions were stronger predictors than social class markers. They emphasized that "social factors were more important than any other set of factors in relating to the child's mental performance at age 5" (p. 1242).

Drillien, Thompson, and Burgoyne (1980) followed 299 VLBW babies born in Edinburgh, Scotland, between 1966 and 1970. All surviving children were evaluated at

6 1/2 to 7 years of age. Of the 299 preterm infants, 261 were examined at school age (8 infants died, 24 moved or were lost to follow up, and 6 refused). One hundred eleven control children were also studied. Psychologists assessed general intellectual functioning, educational attainment, social adjustment, perceptual motor, and verbal skills for each child. The test battery included the following tests: the Wechsler Intelligence Scale for Children (WISC), the Burt-Vernon Word Recognition Test, the Burt-Inglis Spelling Test, the Bristol School Adjustment Guide, a Test of Motor Impairment, the Bender Visual Motor Gestalt Test (Koppitz scoring), and the Goodenough Draw-a-Man Test. An overall test conclusion was drawn for each child. VLBW children were divided into two groups: those with normal neurological status and those with abnormal neurological status. Compared to controls, neurologically abnormal VLBW children scored significantly lower on the WISC full scale and performance scale. Their mean reading quotient was lower, as was their spelling, social adjustment, motor impairment performance, Bender score, and speech. No significant differences were noted between neurologically normal VLBW children and controls.

Siegel (1982) studied the ability of a risk index detailing reproductive, perinatal, and demographic

factors and infant test scores to predict cognitive and language development at 3 years in preterm and full-term infants. Fifty-three very low birthweight preterm infants and 51 full-term children were followed. Originally, the sample included 80 preterm and 68 full-term infants. Those preterm children who dropped out of the study had lower scores than those who remained. Reproductive variables included birth order, amount of maternal smoking, and number of previous spontaneous abortions. Perinatal variables for all infants included birthweight, 1- and 5-minute Apgar scores, and hyperbilirubinemia. For preterm infants perinatal variables also included gestational age, severity of respiratory distress, asphyxia, and apnea. Socioeconomic status, sex, and maternal and paternal educational levels were also analyzed. The Bayley Scales were administered at 4, 8, 12, 18, and 24 months adjusted ages. The Reynell Developmental Language Scales were administered at 2 and 3 years, and the Stanford-Binet Intelligence Scale was administered at 3 years. HOME scores were available for 64 full-term and 27 preterm infants at 12 months. Correlations between risk factors and subsequent cognitive and language development ranged from .38 to .68. Delay was described via scores one standard deviation below the mean score. Developmental delay was correctly predicted in 77% to

89% of the cases with the addition of infant test scores. Total HOME scores and the Provision of Appropriate Play Materials subtest correlated significantly with outcome measures for full-term infants. For preterm infants, the Maternal Involvement and the Variety of Stiumulation scales of the HOME correlated significantly with Stanford-Binet and Reynell Language Comprehension scores. Siegel concluded that preterm children are more susceptible to environmental influence than are full-term children. In general, the risk index tended to overclassify children as being developmentally delayed. Siegel stated that

> children who were classified as being at risk at 12 months but who had scores in the normal range at 3 years came from families with significantly higher scores on the HOME scale. Children not detected as being at risk in infancy but whose development was delayed at 3 years came from families with lower scores on the HOME scale. (Siegel, 1982, p. 963)

Taub, Goldstein, and Caputo (1977) discussed the predictive ability of birthweight, gestational age, birth length, and head circumference on developmental status in middle childhood. Visuomotor performance, personal-social behavior, school performance, and IQ were investigated. A sample of 64 children were chosen from 233 low birthweight survivors and full-term infants. Thirty-eight children were premature and 26 were full term. The lowest birthweight in the preterm

group was 1687 grams. The mean age of the preterm children was 8.3 years and the mean age of the term children was 7.9 years (range for both groups was 7 through 9.5 years). Trained personnel administered the WISC-R and the Bender Visual Motor Gestalt Test (scored using the Koppitz system) to the children while an interviewer had parents complete a questionnaire of the Behavioral Classification Project and a social history report. Mothers were asked to sign releases to allow researchers access to school records. Second grade data were consulted. Findings were considered significant at the .025 level of probability. No statistically significant differences were found for full-scale or verbal IQ. Performance IQs, however, were significantly lower for premature infants (M=97.4) than for full-term children (M=108.0). Prematurely born children were also found to have significantly poorer scores on the Bender Visual Motor Gestalt Test. No significant differences in behavior as reported for the Dreger Behavior Scales were noted. From the social histories, it was found that only 1 of the 12 variables showed a significant sex by birthweight interaction. LBW boys and full-term girls were rated as sickly to age 3 more often than full-term boys and LBW girls. No significant differences in school performance or attendance were noted between groups. The traditional use of

birthweight and gestational age as measures of prematurity was supported. The authors concluded that premature infants continued to show deficits in middle childhood, particularly on visually mediated skills (performance subtests of the WISC-R and the Bender Visual Motor Gestalt Test).

Sensory Processing Skills in Preterm Children

Friedman, Jacobs, and Werthmann (1981) studied the sensory processing in preterm and full-term infants in the neonatal period. They studied 45 preterm and 23 full-term infants born to black mothers between July 1977 and January 1979. Infants were born at the Washington Hospital Center in Washington, D.C., and were tested at 40 weeks conceptual age. All children's birthweights were appropriate for gestational age and pre- and full-term groups were matched for socioeconomic background, mother's education, and prenatal care. Tactile, auditory, and visual processing of 33 preterm and 16 full-term infants were assessed. Two psychologists alternately served as coder and experimenter. No difference was found in tactile processing for preterm and full-term infants. Full-term infants responded more quickly to the visual stimulus and they were also slightly more responsive auditorily.

Sigman (1976) studied the exploratory behaviors of 32 preterm and 32 full-term infants. An equal number of

males and females participated in each group. Her stated rationale for studying the exploration of novel and familiar objects in 8-month-old (conceptional age) infants was that

> preference for novel stimuli is assumed to reflect cognitive processes since the infant must be able to remember a familiar stimulus in order to differentiate between objects, and motivational factors, in that he must be involved enough to choose between objects. (p. 606)

Sigman tested a series of objects for salience and since object preferences did not vary between preterm and full-term children, all were tested using an identical format. All sessions were videotaped for later coding by observers unaware of which infants were term and which were preterm. All children were in their mother's laps at a small table during testing which began with a 6-minute familiarization session in which a small bell was placed in front of the infant. Following this, the bell was paired with 1 of 10 novel items for 1 minute each. Observers coded each infant's behaviors as (a) visual fixation without manipulation, (b) manipulation without fixation, and (c) coordinated visual fixation and manipulation of objects. Multivariate analysis was used to analyze the data. Preterm infants explored the familiar stimulus significantly more than did full term babies. Across both groups, females explored novel objects longer than did males. Exploration of novel

objects was lowest for the high SES premature infant. Sigman also compared performance between high- and low-risk premature infants. High-risk infants were designated as those whose total scores on a series of 13 measures were below 100. An equal number of high- and low-risk premature infants were studied. Subjects were matched for sex and SES. No statistical differences were found between low- and high-risk preterm children for total length of exploration of familiar objects. However, a difference was found in terms of the exploration of novel objects. Low-risk infants played with novel objects longer than did high-risk infants. This difference was in the predicted direction. Sigman's study supported the contention that preterm infants needed more time to become familiar with a stimulus.

Rose (1983) investigated visual recognition memory in eighty 6- and 12-month-old full-term and preterm babies. Ten male and 10 female subjects participated in each of the four groups. Ages adjusted for prematurity were used for the preterm groups; thus, preterm children were an average of 6 weeks older chronologically than were term babies. Rose presented four pairs of visual stimuli to infants during a familiarization and a test phase. The treatment consisted of varying the length of familiarization time (10, 15, 20, and 30 seconds). The

research equipment was set up to record the actual amount of time infants fixed on the stimuli during the familiarization and test phases. This researcher used children's responses to novel and familiar stimuli to derive novelty percentages. Results indicated that familiarization time was related to performance and that full-term babies and preterm infants differed in performance ability. All children's novel response percentages increased as the length of familiarization time increased. Six- and 12-month-old full-term babies showed evidence of recognition memory after 15 and 10 seconds, respectively. Preterm children required more time, and showed evidence of recognition memory after 30 and 20 seconds, respectively. This difference in needed familiarization time for preterm children is further evidence for developmental lags or deficits among preterm children in visual recognition memory at both 6 and 12 months of age.

Behavioral Development in Preterm Children

Astbury, Orgill, Bajuk, and Yu (1983) studied the developmental outcome of a population of 102 VLBW infants at 1 and 2 years of age. Their primary aim was to investigate behavioral outcome. Of the 102 children born between January 1, 1979, and December 31, 1979, 22 died in the neonatal period. Another 3 infants died

prior to discharge and 1 died in infancy. Seventy-six children survived. Of these, 65 were developmentally assessed at 1 and 2 years of age (3 children lived too far away, 2 refused appointments, and 4 could not be assessed due to the severity of their handicaps). The whereabouts of 2 children was not reported in the article. Sixty-five infants were administered the mental, motor, and behavior scales of the Bayley Scales of Infant Development at adjusted ages. The mean birthweight of this group was 1248 (SD 190) grams. Thirty males and 35 females were studied. Fifty-five were born in and 10 were transferred to the Queens Victoria Medical Centre. Results indicated that 11 of the children assessed had major disabilities including 5 cases of cerebral palsy, 1 of blindness due to RLF, 1 of sensorineural hearing loss requiring amplification, 1 of hydrocephalus requiring ventriculo peritoneal shunting, and 1 case of multiple handicap (spastic quadriplegia and cortical blindness). Fifteen of the children had minor disabilities, including 8 with hypertonia of the lower extremities, 1 with hypotonia of the lower extremities, 2 requiring corrective lenses, 2 with conductive hearing losses, 1 with a minor congenital anomalie, and 1 with multiple minor disabilities. Thus, only 39 of the 65 survivors had no disability. The authors further evaluated the behavioral development of

these children. Children were considered either normal or hyperactive. Hyperactivity was identified if children rated in the excessive range on at least four items of the Bayley Infant Behavior Record (object orientation, goal directedness, attention span, endurance, activity, reactivity, and response to sensory areas of interest). At 1 year of age seven of the children were rated as hyperactive. By 2 years of age, 26 children were rated hyperactive. The authors note that psychomotor development lagged behind mental development at both ages and that MDI scores decreased significantly at 2 years of age. Behavior was found to be associated with the drop in MDI scores.

Lasky, Tyson, Rosenfeld, Priest, Krasinski, Heartwell, and Gant (1983) investigated the behavioral outcomes of three groups of high risk infants and a term control group at 1 year of age corrected for prematurity. The 204 survivors were categorized into the following groups: (a) VLBW not requiring ventilator therapy; (b) VLBW requiring ventilator therapy; (c) those weighing more than 1500 grams requiring ventilator therapy; and (d) healthy, term infants. One hundred sixty-nine behavior records were completed for the high risk children and 84 control records were completed. Overall, children scoring lower on the mental and motor scales also received less desirable behavior ratings.

Being ventilated was associated with the poorest overall ratings.

Intervention with VLBW Premature Children

Intervention programs aimed at minimizing the risk for poor developmental outcome with preterm children are gaining popularity and respect (Sweet, Karabinus, Kise, Staub, Schrom, & Rao, 1981). Selected studies are reviewed below.

Scarr-Salapatek and Williams (1973) intervened with low birthweight premature infants born at Philadelphia's General Hospital between November 1968 and November 1969. Thirty infants were alternately assigned to experimental and control groups at birth. All infants weighed between 1300 and 1800 grams at birth and all were from the lowest SES group in Philadelphia. The intervention consisted of having trained nursery personnel provide special visual, tactile, and kinaesthetic stimulation to the experimental group. The authors stated that

> since standard newborn care for premature infants consists of near-isolation from patterned stimulation while in isolettes, our goal was to introduce handling, human faces and voices, and patterned visual stimulation for the E group from birth. (Scarr-Salapatek & Williams, p. 97)

Home visits were also conducted in order to provide instruction and demonstration to the mothers. Results indicate that after one year Cattell Infant Intelligence

Scale scores for the experimental group were significantly higher than for controls, despite the small sample size. Only 22% of the experimental group scored below 90, while 67% of the control group did.

Barnard and Bee (1983) investigated the effects of temporally patterned stimulation on the development of preterm infants. Stimulation consisted of a gentle horizontal movement and a heartbeat sound designed to more closely approximate in utero stimulation. Stimuli were available to infants in one of three temporal patterns. Four groups were studied: (a) a fixed-interval group (N=26) in which stimulation was automatically turned on for 15 minutes of each hour; (b) a "self-activated" group (N=23) in which a 15-minute period of stimulation began after each 90-second period of inactivity; (c) a quasi self-activated group (N=10) in which a 90-second period of inactivity would activate stimuli, but it could not be reactivated until an arbitrary 45-minute period passed; and (d) a control group which received normal hospital care but no additional movement or auditory stimulation. The authors hypothesized that infants in the self-activating and quasi self-activating groups would display more regular sleep patterning and more rapid neurological development. Also, infant cognitive and perceptual development, as well as parent-interaction, were

hypothesized to be different for the different groups. All treatment groups exhibited shorter activity cycles, the quasi self-activating group had the best orientation to visual and auditory stimulation on the Brazelton NBAS at discharge, and all three experimental groups showed fewer abnormal reflexes. At 24 months, Bayley mental scores were signficantly higher for all three experimental groups, with the quasi self-activating group having the highest scores. No differences in mother-child interactions were present.

Powell (1974) hypothesized that increased handling of LBW infants would assist in increasing weight gain and developmental quotients, and that maternal handling would lead to increased maternal positive affect toward her child. Eleven LBW black singleton infants were randomly placed in a maternal experimental group, 13 were placed in a handled experimental group, and 12 were placed in a control group. Of the total 38 infants, 29 remained at 2 months, 25 at 4 months, and 18 at 6 months. Reasons for attrition were cited as (a) long distance from home to the hospital clinic, (b) no telephone, and (c) moving. Mothers in the maternal group had the lowest rate of attrition. Data on the mother and baby were collected at the infant's 2, 4, and 6 months corrected ages. The Bayley Scales of Infant Development and the Maternal Behavior Ratings were used

to assess the mothers and infants. The mean 4-month Bayley mental score was 13.5 points higher for the stimulated groups, while the mean 4-month Bayley motor score was 16 points higher than that of nonstimulated subjects. Also, the 6-month Bayley Infant Behavior Record was significantly higher for stimulated subjects. None of the maternal behaviors approached significance at 2, 4, or 6 months for the maternal or handling groups. Further, Powell speculated that mothers from higher socioeconomic class who had prenatal care stayed away from the hospital more than other mothers because they had fewer external reasons to worry about their babies.

Moxley-Haegert and Serbin (1983) studied the impact of education on caregiver participation in home treatment programs designed to enhance their delayed children's development. Two educational methods were utilized and one control group receiving no education participated. Thirty-nine caregiver-child pairs were studied. Caregivers in a developmental education group were compared with caregivers in a general child management education program and a control group receiving no education. The authors hypothesized that

> if parents can learn to recognize the child's first small developmental change, they may begin to believe that the next developmental change is attainable and thus continue to strive for the desired goal. (p. 1325)

Six severely delayed and seven moderately delayed children participated in each group. Seven of the children were born prematurely. Most caregivers were parents, although two foster mothers, one grandmother, and three fathers were primary caregivers. Pre- and post- treatment assessments were performed. The Bayley Scales of Infant Development served as the pretest. The Caldwell's HOME scale was also administered. The experimental group received a brief course in developmental education taught in the home. The course focused on observation training and recognition of developmental progress. Different, and more general, readings were supplied to the first control condition, which also offered home visits and encouragement. Parents in he second control condition, in which no education was offered, received three phone calls reminding them to fill in journals and record their sessions with their children. All parents were instructed in various developmental exercises to conduct with their children and were given the necessary supplies. The children in the developmental education group gained a greater number of skills and their parents participated more in the home treatment programs than did either of the control groups. At the first year follow-up, parents in the first experimental group

also continued to participate more in their child's treatment program.

Parental Adjustment to and Interaction With Preterm Children

Parents of very low birthweight children clearly undergo birth experiences differently than do parents of healthy term infants. Premature birth is both a physical and emotional crisis. Kublar-Ross (1969) and Harrison (1983) posit that parents grieve for the loss of the expected perfect child with the birth of their preterm infant. Further, these parents are expected to follow an orderly emotional pattern beginning with shock and ending with acceptance as they adjust to their prematurely born infant. The stages through which parents are expected to go include shock, denial, anger (guilt and depression), bargaining, and finally, acceptance and adaptation. Premature birth also carries with it increased sibling and family stress (Crnie, Greenberg, Ragozin, Robinson, & Basham, 1983) as well as higher risk of divorce (Gunther, 1963). These and para e studies of the effects of a physically and/or mentally impaired child in the family are discussed in this section.

In a major study, Wikler, Wasow, and Hatfield (1981) investigated both parental and professional notions of the adjustment process of parents of retarded

children. Their primary purpose was to determine whether one of two popular views was more accurate: (a) the view of "time-bound grief" in which parents of retarded children go through predictable stages on the way to acceptance of the child and adjustment or (b) the less popular view that grief is chronic and never fully accepted. Specifically, they asked how parents reported their adjustment process, how stress varied at designated points over time, and if helping professionals expect parents to experience time-bound grief or chronic sorrow. One hundred social workers from Madison, Wisconsin, and 100 parents of mentally retarded children were selected. Questionnaires were mailed to all selected subjects. Thirty-two parents and 32 social workers responded (follow-up phone contacts were necessary to obtain sufficient parent questionnaires). Parents were asked to report how they really felt, while social workers were asked to respond as they expected parents would respond. Subjects were asked to graph their grief at 10 specific points, i.e., child should have begun walking, talking, etc. Also, a direct question, "Do you experience chronic sorrow?" followed a description of chronic sorrow. The authors reported that

> only one-fourth of the parents indicated that they had experienced time-bound grief. . . The rest of the parents, by far the majority,

> depicted a series of ups and downs with no general upward course. Parents' and social workers' free-form graphs did not differ in form ($F=.16$, 1; 62 df, NS). Evidently, these professionals were sensitive to the fact that parents experience chronic sorrow. (Wikler, Wasow, & Hatfield, 1981, p. 67)

Interestingly, however, social workers overestimated how upsetting early experiences were and underestimated how upsetting later experiences were. For example, the social workers underestimated how upsetting the child's 21st birthday was to parents. With regard to the direct question, "Do you experience chronic sorrow?" Wikler, Wasow, and Hatfield (1981) concluded that

> social psychologists often argue that if you want to know something, the best way to find out is simply to ask. In this case this seems to be true. In response to the question, 63% of the parents and 65% of the social workers said yes, these parents do experience chronic sorrow. (p. 68)

The purpose of Fowle's (1968) study was to determine whether or not the presence of a severely retarded child in the home has a significant effect on marital integration and on siblings. Thirty-five families of severely mentally retarded children (IQ < 50) ages 3 to 17 who had institutionalized their retarded child and a matched sample of 35 families who had not institutionalized their retarded child were studied. Marital integration and sibling role tension were measured by the Farber Index of Marital Integration and the Farber Sibling Role Tension Index. Contrary to

expectation, no significant difference in marital integration between families keeping their retarded child at home and those institutionalizing their child was found. However, further analysis indicated that those families who had institutionalized their children at least 2 years prior to the study had higher marital integration. Sibling role tension was, as expected, significantly higher in families who kept their retarded child home. Older female siblings felt the effects of the presence of the retarded child in the home more than did the oldest male siblings.

Gumz and Gubrium (1972) studied the comparative perceptions of mothers and fathers toward their mentally retarded child. Specifically, they investigated the instrumental and the expressive parental roles. The authors explained that

> the instrumental function focuses on relations of the system with other systems; its goals are to achieve adaptation, to maintain equilibrium, and instrumentally to establish the desired relations to external goal objects. The expressive area concerns itself with the "internal" affairs of the system; to maintain integrative relations between members, and to manage tension between component parts of the social system. (Gumz & Gubrium, 1972, p. 176)

Gumz and Gubrium further explained the importance of these two familial roles by speculating that

> having identified a person's role, one may deduce his probable perception of and attitude toward a given social object. Roles,

> therefore, influence the nature of social interaction among individuals and groups insofar as they affect mental processes. Because of this influence, the primary familial roles (instrumental and expressive) should lead to differential parental perceptions in the case of a mentally retarded child as a social object. (p. 176)

With this in mind, the authors hypothesized that fathers' perceptions of the retarded child would be more instrumental while mothers' perceptions would be more expressive. Fifty Caucasian mothers and fathers of mild and moderately retarded 2- to 5-year-olds were studied. Questionnaires consisted of 32 Likert-type items designed to elicit parental reactions to having a retarded child. An example of an instrumental item was "I want my child to be a leader when he/she plays with other children," while an expressive example was "I worry that because of my child's handicap, he will not realize the importance of getting along with other people" (Gumz & Gubrium, 1972, p. 177). A higher percentage of mothers than fathers scored high on instrumental-crisis items. The author suggested that this might have occurred due to the fact that many more mothers are now working and assuming both instrumental and expressive roles within the family. As predicted, however, a higher percentage of fathers scored high on instrumental extra-familiar and future role items.

Higher percentages of mothers scored high on expressive extra-familiar and future role items.

Zuk, Miller, Bartram, and Kling (1961) investigated the relationship of religious background to maternal acceptance of retarded children. Questionnaires designed to elicit information about attitudes, feelings, and beliefs of mothers of retarded children and religious practices were mailed to 125 mothers who had been in contact with a mental retardation clinic in 1957 and 1958. Seventy-five questionnaires were returned from approximately equal numbers of Catholics and non-Catholics. In addition to the questionnaires, clinical judgments of the mother's acceptance of the child were made by a social worker and a pediatrician. No significant correlation between the pediatrician's and the social worker's judgments was found, however, suggesting that acceptance was judged differently by each. Questionnaire results showed a low but positive correlation for the items tapping discipline of and overdependence in the child with religious involvement. Mothers who rated themselves as more intense in religious practices tended to verbalize more accepting attitudes regarding their retarded children.

In 1969, Fellendorf and Harrow interviewed 500 parents of hearing impaired children. Two hundred sixty parents replied. Sixty-five percent of the parents said

their biggest concern for their children was getting a good education and 30% said that good speech was a big concern. For the future, these parents wanted a good education for their children (40%), acceptance by others (40%), a good job (10%), and good speech (10%). In terms of acceptance of the diagnosis, 81% said that they were convinced the diagnosis was correct after seeing from one to three specialists and 51% reported being satisfied with their first visit to a medical specialist. Failure to respond to sound and failure to begin to talk were the most noticeable initial characteristics reported by parents. The hearing impairment was first noticed primarily by parents. In 16% of the cases, however, grandparents first noticed the hearing loss and in 5% of the cases, medical personnel noticed first. The authors also concluded from survey results that improved parent counseling was needed. The survey "demonstrated that parents desperately need a person to whom they can talk about their concerns and their needs" (Fellendorf & Harrow, 1969, p. 44).

These studies illustrate the personal and familial issues with which parents of impaired children deal. While premature infants may not necessarily suffer from later retardation or physical impairment, they and their

parents are vulnerable to many of the stresses encountered by families of the handicapped.

Early Parent-Infant Separation

Leifer, Leiderman, Barnett, and Williams (1972) studied the effects of separation on mother-infant attachment behaviors. Two groups of preterm mother-infant dyads (22 contact and 22 separated dyads) and one group of full-term infants and mothers (24 dyads) were observed six times over a 2-year period. Nursery procedures for the preterm separation group involved

> 1) separation of mother and infant at birth; 2) placement of infant in an incubator in an intensive care nursery, allowing only visual contact with the infant (3-12 weeks duration); 3) placement of infant, at a weight of 1000 grams, in a bassinet in a discharge nursery, allowing parents all modes of contact as often as they chose to enter the nursery and attend to the infant (7-10 days duration); 4) discharge of the infant, at a weight of 1500 grams, to his parents' care at home. (Leifer, Liederman, Barnett, & Williams, 1972, p. 1205)

Only point 2 was different for the preterm "contact" group. These mothers were allowed to enter the NICU and participate in caring for and handling their infant 2-3 days after birth. Preterm infants were randomly assigned to the separation and contact groups. The full-term infants were all of uncomplicated deliveries and were discharged home within 3 days after birth. In general, middle class mothers were studied using the

Hollingshead Index III and they lived within a 20-mile radius of Stanford University Hospital. A point sampling technique was used to record mother and infant behaviors. That is, behaviors were observed by two observers for the first 5 seconds of each 15-second period and recorded during the remainder of the 15-second period. Behaviors to be recorded were selected prior to the study. Maternal behaviors observed were (a) close body contact (holding, touching, rubbing, kissing, and ventral contact); (b) distal contact (looking and smiling at the infant, talking or singing to the infant, and laughing); (c) interaction excluding caregiving activities. Full-term mothers caressed their infants significantly more often than did contact or separated preterm mothers. Ventral contact and smiling at infants were significantly greater across all observations for full-term mothers. There was no significant difference between contact or separation preterm mothers for ventral contact, although, separated mothers laughed at or sang to their infants more than did contact mothers at the first observation. No significant differences were found for the third behavior observed. In addition to the behavioral differences noted by the authors, interesting anecdotal information was presented. Two of the mothers in the separated group later relinquished custody of their

infants. Five of the six reported divorces occurring during the study were with mothers in the separated group. It was also noted that for the four women that attempted breast feeding, only one previously successful multiparous contact woman was successful.

Field (1977) investigated the effects of early separation on later face-to-face interactions of premature infant-mother dyads. She also manipulated face-to-face interactions in order to find a condition which facilitated interaction. Three groups of 12 mothers and infants were studied: (a) preterm infants who had obtained low Brazelton interactive process scores and their mothers, (b) postterm (gestational age > 40 weeks) babies who had obtained low Brazelton interactive process scores and their mothers, and (c) healthy term infants and their mothers. At 3 1/2 months post due date the infants and their mothers were videotaped in one spontaneous and two manipulated interaction situations. Videotaping sessions lasted 15 minutes each, including a warm-up feeding situation and three 3-minute interaction situations. Field explained the sitations as

> a) a spontaneous face-to-face situation in which the mother was asked to pretend she was at home at her kitchen table playing with her infant; b) an attention-getting situation during which the mother was requested to pretend her husband was taking a movie of their infant and she in turn was trying to

> keep her infant looking at her face; and c) an imitation situation during which the mother was asked to imitate all of her infant's behaviors as they occurred. (p. 765)

The following maternal behaviors were coded: gaze aversion, talking, smiling, poking, caretaking (burping, wiping infant's face), and game playing (peek-a-boo, pat-a-cake). Infant behaviors included gaze aversion, vocalizing, fussing, crying, smiling, and squirming. Six observers rated the tapes and 80% interrater reliability was achieved for each behavior. Dependent measures were (a) the percentage of infant gaze at the mother, (b) the percentage of infant gaze time in which the mother was active, and (c) the percentage of infant gaze-away time in which the mother was active. For all groups, maternal activity was greatest during the attention-getting situation. The mothers of normal infants were least active, then mothers of postmature infants, and finally, most active were mothers of premature infants. High-risk male infants had more limited repertoires and more gaze aversion. In situations where there was more maternal activity, there was less infant gaze. Infants gazed most at their mothers during imitation situations. Normal infants gazed more at their mothers than did postmature or premature infants. Increased maternal activity, therefore, appeared to be an information overload for

infants. Less gaze aversion was noted during maternal imitation activity. Field did not attribute differences between preterm and other groups to separation effects, but rather to the baby's interaction style at birth.

Zeskind and Iacino (1984) studied the visitation patterns of 32 mothers and their preterm infants who were admitted to the NICU. One half of the pairs were admitted to an experimental group and 16 pairs constituted a control group. The primary purpose of this study was to determine if frequency of maternal visitation could be increased by making specific weekly appointments and to see if these scheduled visits would generalize to increase independent visitation. The authors hypothesized that visitation would be increased, that mothers would have a more realistic perception of their infants, and that the infant's length of hospitalization would be decreased. All parents were given the routine care offered by the NICU staff. In addition, the intervention group was provided with the support of a project interventionist who made visitation appointments, clarified information given to mothers about their infants, and who made weekly home visits for the first 6 weeks following discharge. Visits were counted by NICU nursing staff and mothers' perceptions were assessed by Broussard and Hartner's "Your Baby" subscale of the Neonatal Perception Inventory. Length

of hospitalization was assessed by the number of days from each infant's birth to hospital discharge. All hypotheses were supported. Mothers in the control group independently visited their infants more than twice as often as control mothers. The intervention group had more unpleasant perceptions of their infants' present condition (interpreted as more realistic), while they had more hopeful scores for their infants' future development. Strikingly (particularly given the high cost per day of NICU care), the intervention group infants were hospitalized a mean of 8 days less than control infants.

Rosenfield (1980) also studied maternal visitation to the NICU in order to note the frequency of maternal visitation to their VLBW infants, to observe changes in frequency over the length of the hospitalization, to observe the impact of an early stimulation program on visitation, and to assess relationships between socioeconomic and demographic factors on visitation. Seventy-eight VLBW infants were randomly assigned to an experimental and a control group. The two groups of infants did not differ significantly on demographic variables such as birthweight, gestational age, duration of hospitalization, race, or sex. No significant group differences were noted for medical complications of the infants. All infants received standard nursery care.

Intervention infants, in addition, received vestibular stimulation for two 20-minute periods which consisted of "stretching and folding of the infant's extremities, torsion of the trunk, rocking from horizontal to vertical position, and stroking with a variety of textured materials" (p. 940). All parents were allowed to visit at any time. Rosenfield reported that visitation between groups was virtually the same until the stimulation program began. By the fifth week of treatment the experimental group visited significantly more often. Anecdotally, Rosenfield reported that three families who demonstrated atypical visitation patterns suffered serious marital disturbance in the 18 months during which the study was conducted. Typically, mothers and fathers visited their infants together. Of those experiencing marital difficulties, one mother visited far more frequently than did other mothers, one mother visited without the father, and one mother did not visit, but sent the father.

Beckwith, Cohen, Kopp, Parmelee, and Marcy (1976) questioned whether patterns of social transactions between a preterm infant and the primary caregiver facilitated development, if specific dimensions of environmental transactions and specific infant competencies could be detailed, and what relationships existed among caregiver-infant transactions, a general

development test, and a sensorimotor scale. They studied 51 preterm infants born between 1972 and 1974 who were placed in the UCLA nursery. Infants were observed at 1, 3, and 8 months from their expected due dates. Naturalistic observations were made in the subjects' homes. Infant and caregiver behaviors were sampled every 15 seconds. The Gesell developmental schedules were administered in the laboratory at 9 months conceptual age. Kopp, Sigman, and Parmelee's adapted version of the Casati and Levine sensorimotor scales were also administered at 9 months conceptual age. Girls performed significantly better on the Gesell developmental schedules. At 8 months, mutual gazing and vocalizing to the caregiver represented "those infants who were more skillful than their peers on both the Gesell developmental schedules and the sensorimotor scales" (Beckwith et al., 1976, p. 583). Infants at 1 and 3 months who spent less of their waking time in physical care (being burped, diapered, dressed, or bathed) had higher Gesell DQs at 9 months. In conclusion, Beckwith et al. explained that

> preterm infants who differed in their level of development as assessed by the Gesell developmental schedules and a sensorimotor series did not differ in the patterns of social transactions they engaged in with their primary caregiver. (p. 585)

The purpose of Greene, Fox, and Lewis's (1985) study was to evaluate the independent contributions of immaturity, illness, and their interaction on mother-infant interactions. Four groups of infants were compared: (a) healthy premature infants (N=14), (b) sick premature infants (respiratory distress syndrome) (N=16), (c) sick full-term infants (birth asphyxia) (N=16), and (d) healthy term infants (N=16). The authors also investigated the relationship between performance on the Brazelton Neonatal Behavior Assessment Scale (NBAS) and later maternal and infant barriers at 3 months adjusted ages. All infants were assessed via the NBAS as close to term (40 weeks conceptual age) as possible. They were seen again at 3 months conceptual age and were videotaped in a 15-minute free-play situation with their mothers. Videotapes were coded by two trained observers at 10-second periods. On the NBAS, healthy infants displayed better orientation and state regulation and had fewer deviant reflexes. Preterm infants displayed poorer motor control, more deviant reflexes, and less automatic regulation than term infants. At 3 months, healthy infants looked longer at their mothers than did sick infants. Mothers of preterm infants were generally more responsive to their infants. Specifically, they were more vocally responsive. Sick infants received more proximal and

kinesthetic stimulation and less affective and distal stimulation. The orientation scale of the Brazelton accounted for a significant portion of the variance in the infants' "fret/cry" behavior at 3 months. In other words, infants who were alert and attentive on the NBAS cried less during the 3-month observation period. Mothers of infants who were less alert and attentive on the NBAS were more responsive to their children.

Marton, Minde, and Ogilvie (1981) studied mother-infant interactions of 32 very low birthweight infants and their mothers during nursery visits and during the first 3 months at home. Selection criteria for the infants were that they weighed less than 1501 grams, were AGA products of singleton gestations, and had no serious deformity or medical complication at 72 hours of age. All mothers intended to keep their infants and lived within 15 miles of Toronto's Hospital for Sick Children. Two observers recorded infant and maternal behaviors twice a week for a minimum of 40 minutes. While in the NICU mothers were allowed to touch and speak to their infants through isolette portholes. Mothers were classified as "high-activity," "medium-activity," or "low-activity" mothers. The authors found, as expected, that maternal behaviors, i.e., smiling, follow infant behaviors, i.e., stretching. Further, it was found that high-activity

mothers were considered responsive whereas low-activity mothers were not. For example, high-activity mothers responded (touched) their infants when the eyes were open. Low-activity mothers did not respond to opened eyes. Thus, interaction with high-activity mothers was more easily directed by the infant.

Crnie, Greenberg, Ragozin, Robinson, and Basham (1983) examined the effect of stress and social support on maternal attitudes and mother-infant behavior with groups of premature and full-term infants. Fifty-two infants were premature with birthweights under 1800 grams and 53 infants were full-term and weighed over 2500 grams. Infants were matched for family ethnicity and mother's education. All infants were born at or transferred to the University of Washington Hospital. One month after discharge parents participated in a structured interview consisting of measures of life stress, social support, general life satisfaction, and satisfaction with parenting. At 4 months corrected age, mothers and infants were seen at the clinic for a behavioral observation in which a 10-minute free-play period, a 5-minute vocal elicitation period, and a 3-minute imitation period were videotaped. Global measures were made of (a) gratification from interaction, (b) responsiveness, and (c) affective tone (angry to happy). Also, 60 specific behaviors were

scored as present or absent for the vocal elicitation period. The authors found no significant group differences on any measures between mother-premature infant and mother-full-term infant pairs. They stated

> that no premature-full-term group differences were found was surprising and somewhat counterintuitive, as it was expected that mothers of prematures would have reported greater stress and possibly have less positive attitudes and behavior. However, the lack of group differences may have been a function of the generally healthy status of the premature infants in the sample, and the fact that the groups were carefully matched on variables other than infant birth status. (Crnie, Greenberg, Ragozin, Robinson, & Basham, 1983, p. 216)

Mothers with greater social support and less stress were more satisfied with life in general. Intimate and friendship support predicted mothers' attitude toward parenting, and stress produced a significant relationship to maternal behavior. Mothers reporting more stress were rated as less sensitive to their infant's cues. Mothers with more intimate support had more responsive infants.

In a follow-up study, Crnie, Ragozin, Greenberg, Robinson, and Basham (1983) continued to study mother-infant interactions of the 52 mother-preterm and 53 mother-full-term pairs. By the time infants reached age 12 months, the attrition rate was 32% and was reportedly slightly higher for preterm infants than term infants. The purposes of this study were to assess

mother-infant interactions throughout the first year of life and to assess the stability of interaction patterns established within the first 4 months over the course of the first year. At 1 month, researchers conducted structured home interviews, and at 4, 8, and 12 months corrected ages, 10-minute unstructured free-play episodes, followed by 5-minute semistructured episodes were videotaped. At 4 and 8 months mothers were asked to encourage their infants to make sounds and at 12 months mothers were asked to look at picture books with their infants during the semistructured episodes. Also, at 4 months the Bayley Scales of Infant Development were administered and at 8 months another parent interview was conducted. The HOME scale was also administered. At 12 months the Bayley Scales were again administered. Further, at 12 months the infants' use of gestural and vocal communication was assessed. The authors stated that there were "major differences in the direction of greater activity and less positive affect on the part of mothers of premature infants during the first year" (p. 1203). Specifically, mothers of premature infants (as compared to mothers of term infants) spent more time in proximity to their infants, they held their infants more while in proximity, and they engaged in more tactile-kinesthetic stimulation of their infants. At 4 months of age, mothers of preterm infants vocalized far

more to their infants, and less so at 8 and 12 months. Premature infants smiled less often than term infants and they averted gaze from their mothers significantly more often. Premature infants displayed less positive affect (smiling) than did term infants throughout the first year of life. Also, preterm infants vocalized significantly less often than full-term infants. Premature infants scored lower on the Bayley mental and motor scores, the expressive language scale of the REEL, and in observed gestural and vocal communication.

Crawford (1982) compared mother-infant interactions for preterm and full-term infants at 6 and 14 months chronological ages. Sixteen premature and 16 full-term infants were studied. The mean birthweight for premature infants was 1287 grams, and for full-term infants, 3242 grams. The mean preterm gestational age was 29.6 weeks, while full-term gestations averaged 39.6 weeks. Four half-hour observations were made in the home for each infant at 6 and 14 months. Mother and infant behaviors were recorded in sequential 10-second intervals. Interactions were scored using Clarke-Stewart's predetermined behaviors. Infant behaviors included looking at objects or places, looking around the environment, fretting or crying, vocalizing, and playing with objects. Maternal behaviors included holding the infant, attending to the infant's needs,

affectionate hugging or kissing, and talking to the infant. Crawford found that premature infants were more fretful and they looked at objects and the environment more. Full-term infants played with objects more than did preterm infants. Mothers of premature infants spent more time in caretaking behaviors and they demonstrated a higher frequency of affectionate behaviors. The author noted, however, that differences could be attributed to the fact that, biologically, preterm infants were younger at each observation. Additional analyses showed that many differences disappeared when adjusted ages were taken into account. Only two differences remained. Premature infants looked at objects or places more than full-term infants and mothers of preterm babies appeared more affectionate toward their offspring. Also, mothers of premature babies spent less time overall with their infants than mothers of full-term infants.

Lester, Hoffman, and Brazelton (1985) undertook a fascinating study of the synchrony of mother-infant interactions for term and preterm infants. Their study was based on the premise that cycles of attention and nonattention are part of the development of social interaction and that precursors of language development include such rules of communication as reciprocal turn taking. They hypothesized that it would be more

difficult for preterm than term infants to maintain a smooth interactive sequence. Twenty term and 20 preterm Caucasian infants from comparable socioeconomic groups were studied. Preterm infants ranged in birthweight from 680 to 2440 grams and constituted low-, moderate-, and high-risk infants. Infants were videotaped (one camera on the mother and one on the child) interacting with their mothers in a face-to-face paradigm at 3 and 5 months ajusted ages. The resultant tapes were merged onto split screens displaying frontal views of infant and mother. Spectral analysis was used to analyze second-by-second monadic phases of interaction. Differences in coherence were found between term and preterm dyads. The authors explained that "higher levels of synchrony in term infants. . . increased from 3 to 5 months" (p. 24) and that "preterm infant-mother dyads were less able to coordinate their behavioral cycles of affect and attention during social interaction" (p. 24). Further analysis of the data revealed differences between full- and preterm infants in lead-lag time. Term infants dominated the interaction at 3 months, and even more at 5 months. Preterm infants did not dominate (lead) interactions at either age. This finding is in accordance with others that suggest that mothers of preterm children work harder to involve their preterm child in interaction by

often leading the interaction, which may result in, as Field (1977) described "a gaze averting, fussing, squirming infant and an over-active, intrusive, frustrated mother" (in Lester et al., 1985, p. 24).

Blumberg (1980) investigated maternal depression, anxiety, perceptions of the newborn, maternal attitudes toward pregnancy and childbirth, and cognitive style. She studied 100 low socioeconomic and minority women between 1 and 5 days after the birth of their child. Five levels of infant risk status, ranging from high risk to no suspected risk, were used to categorize mothers. It was hypothesized that (a) higher levels of infant risk would be associated with higher levels of postpartum depression and anxiety, (b) maternal attitudes toward pregnancy and childbirth would influence postpartum adjustment, (c) maternal cognitive style would have an effect on postpartum adjustment, and (d) maternity and demographic background variables would be associated with maternal adjustment. Maternal attitude was assessed by the Maternal Attitude to Pregnancy Instrument (MAPI), maternal cognitive style was assesssed by the Embedded Figures Test (FT), postpartum and prepregnant levels of depression were assessed via the Depression Adjective Check List (DACL), anxiety was assessed by the State-Trait Anxiety Inventory (STAI), and maternal perception of the newborn

was assesssed by the Neonatal Perception Inventory (NPI). As predicted, Blumberg reported that level of neonatal risk was significantly related to level of depression and level of anxiety. That is, mothers of infants at higher risk felt more depression and anxiety. They also had more negative perceptions of their newborns. Negative attitudes toward pregnancy and childbirth also were associated with higher postpartum anxiety. The hypothesis that field dependent mothers would have more depression, anxiety, and negative perceptions of their newborns was unsupported. Blumberg found no significant relationship between risk and SES or ethnicity. Blumberg concluded that the risk status of the newborn did impact on mother's perceptions and that mothers of high-risk infants suffered increased psychological stress. Blumberg (1980) further concluded that "follow-up research is needed to determine if the crisis abates or if it has an enduring effect on the mother-infant relationship" (p. 149).

Jeffcoat, Humphrey, and Lloyd (1979) compared parental attitudes in two groups of families: (a) those with prematurely born infants and (b) those with full term infants. Seventeen mothers were interviewed in each group. Thirteen fathers in the preterm group and 12 fathers in the full-term group also participated. Parental perceptions were assessed via an adapted

version of the Neonatal Perception Inventory when preterm infants were a mean of 53 weeks of age and full-term infants were a mean of 51 weeks of age. While there were no significant differences between parent groups in terms of variables such as previous experience in caring for small babies, amount of social support, social class, education, or ethnic origin, parents of preterm infants saw, touched, and held their babies later than did parents of full-term infants. Jeffcoat et al. found that fathers in the two groups did not differ significantly in when they first felt love for their infant (most within a week or two). Mothers, however, differed significantly in when they first felt love. Eight of the 17 mothers of preterm infants reported not feeling real affection for about 2 months. Of the six "early attachers," five had held their baby within one week of life. The majority of the "late attachers" held their babies after the second week of life. The preterm mothers also had significantly lower scores on the Neonatal Perception Inventory as compared to control parents. In addition, preterm mothers perceived their babies as more difficult than other participants. Fear of death was common among parents of premature infants (10 mothers and 6 fathers), as was anxiety about leaving their child with a babysitter. In conclusion, the authors claimed disturbance in

parent-child relationships for parents of preterm infants. They further noted that two of the preterm children had been abused or neglected.

Self-Esteem and Locus of Control

Givelber (1985) emphasized the importance of the early parent-child relationship to the development of self-esteem. Specifically, she emphasized the reciprocity of the parent-infant relationship and stated that many factors shape a mother's self-esteem in the parenting role, including the parent's pre-existing self-esteem and the infant's characteristics which include the maturity of the child's neurostructure, temperament, tolerance for stress, and ability to be soothed. Given the immature status of the prematurely born infant, maternal self-esteem is likely to be affected. An impaired or immature child may be less able to respond to the parent. Further, Givelber stated that unresponsive or fretful infants can deprive parents of a sense of their own worth and that a defective child can lower parents' self-esteem. This study investigated the self-esteem of mothers and their 5- to 7-year-old prematurely born children.

Locus of control (internal or external) is a construct, akin to learned helplessness or a sense of powerlessness, that has received continued attention over the last three decades. The locus of control

construct has been associated with children's independence (Lefcourt, 1983) and attitudes relative to achievement situations and feelings of control (Battle & Rotter, 1963). The development of locus of control, its relationship to achievement, and its relationship to socioeconomic class and race are discussed in this section.

Lefcourt (1976) explained the basis for predicting a relationship between locus of control and academic achievement. He stated that

> the link between locus of control and cognitive activity appeals to common sense. In like fashion, common sense suggests that a disbelief in the contingency between one's efforts and outcomes should preclude achievement striving. Without an expectation of internal control, the postponement of immediate pleasures, and the organizing of one's time and efforts would be unlikely. Common sense would dictate that these characteristics, essential to any prolonged achievement effort, will occur only among individuals who believe that they can, through their own efforts, accomplish desired goals; that is, individuals must entertain some hope that their efforts can be effective before one can expect them to make the sacrifices that are prerequisite for achievement. (p. 67)

In the Coleman Report (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, & York, 1966), it was noted that locus of control orientation was a significant determinant of academic achievement.

Battle and Rotter (1963) investigated the interaction of social class and ethnic group with locus of control. The purposes of their study were (a) to develop an internal-external scale to be used with children and (b) to determine the relationship between age, sex, social class, ethnic group, and IQ and locus of control. The authors studied 80 sixth and eighth grade students selected on the basis of sex, social class, and race. The California Mental Maturity Test was used to measure intelligence. The Bialer Locus of Control Questionnaire (N=40) and a six-item projective cartoon test (N=38) were used to assess locus of control. A line matching test in which the experimenter controlled success and failure without the subject's knowledge was also administered in order to assess success and failure expectancies. Significant differences were found based on ethnic group and social class. Middle-class white subjects were most "internal"; lower-class blacks were most "external." In general, "internals" were more certain of success than "externals." Sex was not predictive of locus of control and the California Mental Maturity Test scores did not relate to locus of control when class and race were controlled.

In addition to relationships with achievement and income, Lefcourt (1983) reported that researchers "have

found a warm, positive parental cluster of personality attributes associated with children's internality" (p. 35). Lefcourt (1983) noted that researchers have found that parents of internally controlled children allowed their children greater independence at earlier ages. These children also received less physical punishment (Lefcourt, 1983).

Further, Lefcourt (1983) suggested that children's locus of control can be changed in relatively short periods of time with the proper intervention. Black inner-city children reportedly became more internal the longer they participated in a classroom management system using a token economy (Lefcourt, 1983). Nowicki and Barnes' (1973) had counselors teach black inner-city children attending a one-week structured outdoor camp the connection between their behaviors and the consequences of their behaviors. Reportedly, children became more internal after one week, and significantly more internal after two weeks at the camp.

In this study, the relationship between mothers' locus of control and their 5- to 7-year old prematurely born children's locus of control was studied. It was hypothesized that mothers who demonstrated an internal locus of control would raise children who also demonstrated an internal locus of control.

CHAPTER III
METHODOLOGY

Overview

This study was designed to investigate the perceptions, self-esteem, and locus of control of mothers of very low birthweight, prematurely born children. Their children's locus of control, self-esteem, intellectual ability, and social/emotional status were also studied. The relationships between these parent and child variables were investigated. Further, this study was designed to provide school psychologists, infant development specialists, social workers, pediatricians, teachers, parents, and others who may work as multidisciplinary team members, an expanded understanding of the relationships between premature birth and later development.

Population

The target population for this study included both prematurely born children and their mothers. All participating children were born between January 1, 1979, and December 31, 1980. They had gestational periods of 37 weeks or less and weighed 1500 grams or

less at birth. All children had been hospitalized in the Shands Teaching Hospital Neonatal Intensive Care Unit, Gainesville, Florida, and were participants in the Florida Regional Perinatal Follow-Up Program, HRS District III. The Shands NICU is one of the nine state centers of the Regional Neonatal Intensive Care (RNIC) Follow-Up Program. These centers all evaluate the medical and developmental status of premature and sick babies at 6, 12, 36, and 48 months of age. The Shands center also evaluates the children at 60 months of age. All children who met these criteria and their mothers were eligible to participate in this study. A total of 136 children participating in the project met these criteria.

Sample

The sample of children was drawn randomly from the 136 subjects meeting the criteria. Selection continued until 30 children and their mothers meeting the eligibility requirements agreed to participate. Of the 136 families who met criteria, it was necessary to attempt to contact 74 families in order to obtain the desired sample of 30 children and their mothers. The most common reasons for non-participation included disconnected telephone numbers, reaching persons who had no knowledge of the potential participant, or obtaining

no answer at all. All reasons are included in Table 3-1.

Table 3-1

Subjects' Responses to Participation Requests

Total number of families selected	74
Reasons for non-participation:	
Wrong telephone number	19
Disconnected telephone number	11
Repeated no answer	6
Family lived too far away (2 in Key West, 1 in Georgia)	3
Child not born at Shands	1
Child deceased (crib death)	1
Mother refused	2
Paternal grandmother was primary caretaker	1
Total who did not participate	44
Number of mothers who did participate	26
Number of mothers who had twins participating	4
	74

Hypotheses

To investigate the relationships among maternal variables and the intellectual ability and

social/emotional status of prematurely born children, the following null hypotheses were tested.

$H_0$1. There is no relationship between mothers' self-esteem and their prematurely born children's self-esteem.

$H_0$2. There is no relationship between mothers' self-esteem and their prematurely born children's intellectual ability.

$H_0$3. There is no relationship between mothers' self-esteem and their prematurely born children's social/emotional status.

$H_0$4. There is no relationship between mothers' locus of control and their prematurely born children's locus of control.

$H_0$5. There is no relationship between mothers' locus of control and their prematurely born children's intellectual ability.

$H_0$6. There is no relationship between mothers' locus of control and their prematurely born children's social/emotional status.

$H_0$7. There is no relationship between mothers' perceptions of their children's intellectual ability and their prematurely born children's actual intellectual ability.

$H_0$8. There is no relationship between mothers' perceptions of their children's intellectual

ability and their prematurely born children's social/emotional status.

$H_0$9. There is no relationship between mothers' perceptions of their children's social/emotional status and their prematurely born children's intellectual ability.

$H_0$10. There is no relationship between mothers' perceptions of their children's social/emotional status and their prematurely born children's actual social/emotional status.

$H_0$11. There is no relationship between mothers' income level and their prematurely born children's intellectual ability.

$H_0$12. There is no relationship between mothers' income level and their prematurely born children's social/emotional status.

$H_0$13. There is no relationship between the prematurely born child's intellectual ability and maternal variables (income level, self-esteem, locus of control, and perceptions of the child's intellectual ability and social/emotional status) when neonatal risk factors are included.

$H_0$14. There is no relationship between the prematurely born child's social/emotional status and maternal variables (income level, self-esteem,

locus of control, and perceptions of the child's intellectual ability and social/emotional status) when neonatal risk factors are included.

The .10 level of significance was the minimum used to reject a null hypothesis.

Design and Relevant Variables

This was an ex post facto study of mothers and their 5- to 7-year-old children who survived VLBW, premature births. Thirty children and their mothers were studied. Each mother who agreed to participate in the study responded to three questionnaires. A multiphasic test battery was used to assess the self-esteem, locus of control, intellectual ability, and social/emotional status of the preterm children. The battery included (a) the Stanford-Binet Intelligence Scale; (b) the Preschool and Primary Nowicki-Strickland Internal-External Control Scale; (c) a Human Figure Drawing; (d) The Primary Self-Concept Inventory; and (e) a "normal," "at risk," or "abnormal" social/emotional global assessment made by a school psychologist specializing in the assessment of young children. These assessments were made to measure the dependent variables of intelligence, locus of control, self-esteem, and social/emotional status. Stanford-Binet intelligence quotients and the psychologists' social/emotional

assessments were taken from the children's 5-year developmental assessment record. Where 5-year developmental assessment records were not available, Stanford-Binet IQs and social/emotional assessments from the 4-year developmental assessment records were used. It was necessary for the researcher to give four of the children the Stanford-Binet Intelligence Scale in addition to other research instruments because their current IQ scores were not on file.

There were six independent variables, including (a) neonatal factors, (b) annual income, (c) mothers' locus of control, (d) mothers' self-esteem, (e) mothers' perceptions of their children's intellectual ability, and (f) mothers' perceptions of their children's social/emotional status. Measures of the first two variables were obtained from medical and developmental records. Self-esteem was measured by the Tennessee Self-Concept Scale (TSCS). Locus of control was measured by the Adult Nowicki-Strickland Internal-External Control Scale (ANSIE). Mothers' perceptions were assessed via the Parent Perception Profile, a structured interview designed by the researcher (Appendix A).

Instrumentation

The Stanford-Binet Intelligence Scale, Form L-M, was used to assess the children's intelligence quotients.

Stanford-Binet IQs were obtained from medical and developmental records at the Children's Developmental Services Center, Gainesville, Florida. Reliability varies as a function of age and IQ for this instrument. For ages 2 1/2 to 5 1/2, the reliability coefficients range from .83 to .91 (Terman & Merrill, 1973, p. 10). Human Figure Drawing mental ages supplemented Stanford-Binet IQs.

Scores for neonatal factors were obtained using the Hoebel, Hyvarinen, Okado, and Oh (1973) high-risk screening system. Each medical complication was assigned a weighted value according to its presumed risk. Categories of risk included general, respiratory, metabolic, cardiac, hematologic, and central nervous system problems. A total score reflected the severity of neonatal complications. A summary of medical complications was derived from a review of each child's existing medical record.

Maternal self-esteem was assessed using the Tennessee Self-Concept Scale (TSCS). This scale consists of 100 self-descriptive items for which the respondent chooses one of five responses ranging from "completely false" to "completely true." The Counseling Form (TSCS-CF) was used for the purposes of this study. While 14 subscores can be derived from the TSCS-CF, only the Total Positive Score, which reflects the overall

level of self-esteem, was used. The TSCS manual (Fitts, 1965) reported a test-retest coefficient of .92 for a sample of 626 people on the Total Positive Score. Bentler (1972) reported a correlation coefficient of -.70 between the Total Positive Score and the Taylor Manifest Anxiety Scale (p. 366). Bentler also mentioned correlations with various MMPI scales in the .50s and .60s. He further stated that

> many psychometric qualities of the scale meet the usual test construction standards that would exist in an instrument that hopes to receive wide usage. (p. 366)

The questions of the Tennessee Self-Concept Scale were read to mothers in their homes and responses were recorded by the researcher.

The Adult Nowicki-Strickland Internal-External Control Scale (Nowicki & Duke, 1983) was used to assess the mothers' locus of control. This scale consists of 40 yes/no questions. The items were read to the mothers. Lefcourt (1983) stated that this scale has a "simple reading level, acceptable reliability, and initially satisfactory validity for noncollege populations" (p. 10). Lefcourt (1983) reported Kuder-Richardson reliabilities of .69 for 40 white, college men and .39 for 40 white, college women. He reported a .65 test-retest reliability for a 7-week period. Nowicki and Duke (1983) reported a split-half correlation of

.74 and a test-retest correlation of .83 for a 6-week interval.

The Parent Perception Profile, developed by the researcher, was used to assess mothers' perceptions of their children. The profile consists of four major sections about which parents' perceptions of their children in the past, present, and future are solicited: (a) impact on family, (b) intellectual ability, (c) physical ability, and (d) social/emotional status. Mothers' perceptions about their children in the past, present, and future of the intellectual and social/emotional domains were used in this study. These questions were read to the mothers and the responses were recorded by the researcher.

Validity and reliability for the Parent Perception Profile had not been undetermined. The interview statements had undergone pilot testing for ease of administration and clarity of items. Several initial changes had been made based on suggestions from parents and professionals responding to the statements. For example, the response format was changed from yes/no answers to a 5-point, Likert-type scale. Several items were rewritten to avoid ambiguity. Words such as "never" and "always" were avoided, and double negatives were rewritten to avoid confusion. A panel of three experts were asked to place each of the 120 questions

(written separately on 3 by 5 inch cards) into one of the 12 identified categories. One hundred percent agreement was established. The resulting questions for the Parent Perception Profile also were pilot tested by a parent educator in Volusia County, Florida. Volunteers from the Volusia County parent groups were asked to complete the interview in a group setting; each respondent was asked to record his or her answers on an answer sheet.

The Preschool and Primary Nowicki-Strickland Internal-External Control Scale (PPNSIE) (Lefcourt, 1983) was used to assess the children's locus of control. This version consists of a 13-item scale suitable for use with young children. It has a yes/no response format. Lefcourt (1983) stated that the scale "has shown promising psychometric properties" (p. 10). However, no specific data regarding this scale were presented in his review.

The Primary Self-Concept Inventory (Muller & Leonetti, 1974) was used to assess the children's feelings about themselves. This instrument requires the children to point to one of two pictures reflecting either a negative or positive self-perception. The pictoral format is appropriate for young children. The test was designed to measure six aspects of self-concept, clustered into three domains. The

Personal-Self domain is made up of physical size and emotional state factors. The Social-Self domain consists of peer acceptance and helpfulness factors. The Intellectual-Self domain comprises success and "student-self" factors. The test yields a total self-concept score, three domain scores, and six factor scores (percentile ranks). Pearson product-moment correlation coefficients for test-retest reliability ranged from .57 for a sample of 100 Las Cruces, New Mexico public school students to .91 for a sample of 372 public school students in the Las Cruces, New Mexico bilingual project. Construct validity was judged by 11 experts who were asked to sort the items into six categories. Percentile ranks are derived from data gathered from the 2085 children comprising the normative sample.

The widely used Human Figure Drawing (HFD) technique, appropriate for children ages 5 to 12, also was used. Koppitz has popularized a method of scoring the drawings for developmental and emotional indicators. Harris (1972) stated that "the chief advantages of both scales are brevity and ease of scoring. The items are simple, and 'self-evident', and thus, quite objective" (p. 411). Interrater reliability was initially established by two psychologists who evaluated 25 drawings for the 30 developmental and 30 emotional

indicators. Interrater reliability was quite high, for as Harris noted (1972), "ninety-five percent of the total judgments made were checked by both psychologists. On 10 of the drawings there was perfect agreement on scoring" (p. 412). Koppitz scoring for emotional indicators and Goodenough scoring for developmental items yielded number of emotional indicators and mental ages, respectively. Number of emotional indicators and mental ages were correlated with maternal perceptions of past, present, and future social/emotional status and intellectual ability.

The social/emotional global assessment made by psychologists was taken from developmental records. It was weighted as follows: "normal" represented a value of 1; "at risk" represented a value of 5; and "abnormal" represented a value of 10. In addition, the number of Human Figure Drawing-Emotional Indicators and the psychologists' assessment were added to form a combined assessment of social/emotional status.

Procedures

Permission to conduct the study was granted by the University of Florida Institutional Review Board. A summary of the proposed study, a sample letter of informed consent (Appendix B), and copies of this chapter were forwarded for evaluation.

Subjects were randomly selected from a computer generated list of subjects meeting the criteria described earlier. In most cases, mothers received a phone call informing them of the nature of the proposed evaluation procedures. An appointment date and time were arranged, and explicit directions to the home were sought. In four cases, the examiner contacted the families directly at their home because they had no telephone.

Upon arrival at the home, the principal researcher introduced herself and explained the study in greater detail. The researcher read and explained the informed consent letter. The mother was asked to read, date, and sign the informed consent letter on behalf of herself and the child.

Testing began with the child. Each child was first asked to respond to a Children's Verbal Consent statement (Appendix C). All children agreed to participate. Each child was then asked to draw a picture of a person (HFD). Following this, the child was read the 13 items of the Preschool and Primary Nowicki-Strickland Internal-External Control Scale. The researcher recorded the child's response to each item. Finally, the child was asked to respond to the Primary Self-Concept Inventory. Each child received a pack of

eight crayons and a few sheets of drawing paper for his or her participation in the study.

The mother was read each item of the Tennessee Self-Concept Scale and was instructed in how to respond (i.e., completely false, mostly false, partly false and partly true, mostly true, and completely true). The items were read to the participants to insure that they were understood and did not exceed the mothers' reading levels. Answers were recorded by the researcher.

The Adult Nowicki-Strickland Internal-External Control Scale was administered in like manner. The researcher read each item and recorded the responses. Finally, the Parent Perception Profile was read to the mother and answers were recorded by the researcher. Total testing time took approximately one hour. The four children to whom the Stanford-Binets were administered required approximately an additional 45 minutes of testing.

Following home data gathering, medical and developmental records were consulted for the children's neonatal risk factors, Stanford-Binet IQ score, income level, and social/emotional assessment. The income level was taken from the most recent records.

Data Analysis

In the following chapter, descriptive statistics, such as measures of central tendency and dispersion, are

provided for each of the variables. Specifically, ranges, means, and standard deviations are reported for neonatal factors, children's IQ scores, numbers of human figure drawing emotional indicators, and Primary Self-Concept Inventory scores. Descriptive statistics are also reported for data collected on maternal variables such as the Total Positive scores for the Tennessee Self-Concept Scale, the Nowicki Scale scores, and the Parent Perception Profile scores.

Following descriptive statistics for all data collected, Pearson product-moment correlation coefficients and Spearman rank-order correlation coefficients were calculated as appropriate and reported for each of the first 12 hypotheses.

In using Pearson product-moment correlations, sources of variation which explain 13% or more of the variability in the dependent variable are typically considered to have a large effect size, while sources of variance which explain 6% and 1% of the variance in the variability in the dependent variable are considered to have medium and small effect sizes, respectively (Olejnik, 1984). A medium effect size was felt to be meaningful given the large number of variables which influence child development. In order to detect a medium effect size if the probability of a Type I error were set at .10 and power at .5, a minimum of 30

subjects would be needed for an adequate sample size when using Pearson product-moment correlations (Olejnik, 1984). These parameters were felt to be acceptable given the nature of the instruments used in this study and the population studied.

The final two hypotheses required a multiple regression analysis. Stepwise regression analysis was used to examine the relationships between maternal variables and children's intellectual ability and also to examine the relationships between maternal variables and children's social/emotional status. Neonatal risk factors were also included in each analysis. This analysis tested these two hypotheses by providing information about the cluster of maternal variables which best explained the variability in children's intellectual ability and social/emotional status.

CHAPTER IV
RESULTS OF THE STUDY

Reported in this chapter are the data derived from this study. The data are presented in two major sections. In the first section, the descriptive statistics are detailed. The results of testing each of the hypotheses are addressed in the second section.

Descriptive Statistics

The total sample of 30 children and their mothers included 11 male and 19 female children, from 16 white families and 14 black families. The breakdown by race and income level is presented in Table 4-1. Marital status of the mothers is presented in Table 4-2.

Table 4-1

Characteristics of Participating Families by Race and Income

	$0-4,000	$4,000-8,000	$8,000-12,000	$12,000+
Black	10	2	2	0
White	2	1	2	11

Table 4-2

Marital Status of the Mothers

	Married	Divorced	Separated	Widowed	Single
White	12*	1**	0	0	0
Black	1	2	2	0	8***

*Two white, married mothers had twins; **One white, divorced mother had twins; ***One black, single mother had twins.

The ranges, means, medians, modes, and standard deviations for each of the maternal variables studied are presented in Table 4-3. Ranges, means, medians, modes, and standard deviations for child variables are presented in Table 4-4.

Evaluations of Hypotheses

$H_0$1. There is no relationship between mothers' self-esteem and their prematurely born children's self-esteem.

This hypothesis was investigated by determining the relationship between mothers' responses to the Tennessee Self-Concept Scale (TSCS) and children's responses to the Primary Self-Concept Inventory (PSCI). A Pearson product-moment correlation coefficient of -.0956 was found. Testing this value using the formula $t=r\sqrt{n-2/1-r^2}$ yielded an observed value of t=-.5081. The decision rule stated to reject the null hypothesis if the observed value

Table 4-3

Descriptive Statistics for Maternal Variables

	Range	Mode	Median	Mean	S.D.
ANSIE	10-38	33;35	32.5	29.833	6.058
TSCS	309-425	*	369	366.200	31.491
POI-PA	20-50	38	38	36.900	6.666
POI-PR	23-50	50	46	43.400	7.079
POI-FU	23-50	50	47	44.333	7.392
POI-TO	22-50	40;46	42	40.733	6.721
POSE-PA	27-50	50	46	44.233	5.992
POSE-PR	29-50	47	42	42.300	4.750
POSE-FU	31-50	50	50	46.767	5.124
POSE-TO	34-50	48	45	44.467	3.893

Note. ANSIE=Adult Nowicki-Strickland Internal-External Scale; TSCS=Tennessee Self-Concept Scale; POI-PA=Perceptions of Intellect-Past; POI-PR=Perceptions of Intellect-Present; POI-FU=Perceptions of Intellect-Future; POI-TO=Perceptions of Intellect-Total; POSE-PA=Perceptions of Social/Emotional Status-Past; POSE-PR=Perceptions of Social/Emotional Status-Present; POSE-FU=Perceptions of Social/Emotional Status-Future; POSE-TO=Perceptions of Social/Emotional Status-Total.
*TSCS Mode was indeterminant.

Table 4-4

Descriptive Statistics for Child Variables

	Range	Mode	Median	Mean	S.D.
Risk	1-107	*	50.5	48.900	25.594
PPNSIE	4-11	6	6	6.533	1.737
PSCI	1-87	33	40.5	41.367	26.545
SBIQ	57-136	*	90	93.533	18.684
HFD-MA	56-115	87&97	91	92.867	14.857
HFD-EI	0-7	2	2	2.600	1.773
PSY-S/E	1-5	1	1	1.533	1.383
TO-S/E	1-11	3	3.5	4.133	2.460

Note. Risk=Hoebel's screening measure; PPNSIE= Preschool and Primary Internal-External Scale; PSCI=Primary Self-Concept Inventory; HFD-MA=Human Figure Drawing-Mental Age; HFD-EI=Human Figure Drawing-Emotional Indicators; PSY-S/E=Psychologists' Assessment; TO-S/E=HFD-EI + PSY-S/E.
*Risk and Stanford-Binet mode - indeterminant.

of t is greater than the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. The observed value did not exceed 1.313, thus, the null hypothesis was not rejected. Therefore, no statistically significant relationship existed between mothers' self-esteem and their prematurely born children's self-esteem.

$H_0 2$. There is no relationship between mother's self-esteem and their prematurely born children's intellectual ability.

This hypothesis was investigated by determining the relationships between mothers' self-esteem (Tennessee Self-Concept Scale results) and children's Stanford-Binet IQs and Human Figure Drawing mental ages. A Pearson product-moment correlation coefficient of .0542 was found between TSCS results and children's IQs. Testing this value using the formula $t=r\ n-2/1-r^2$ yielded an observed value of $t=.2870$. The decision rule stated to reject the null hypothesis if the observed value of t is greater than the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. The observed value did not exceed 1.313, thus, the null hypothesis was not rejected.

Analysis of the relationship between mothers' self-esteem and children's mental ages yielded a Pearson product-moment correlation coefficient of -.0349. Testing this value using the above formula yielded an observed value of $t=-.1847$. The observed value did not exceed 1.313, thus, this null hypothesis was not rejected. Therefore, no statistically significant relationship existed between mothers' self-esteem and their prematurely born children's intellectual abilities.

$H_0 3$. There is no relationship between mothers' self-esteem and their prematurely born children's social/emotional status.

This hypothesis was investigated by determining the relationship between mothers' responses to the Tennessee

Self-Concept Scale (TSCS) and the number of emotional indicators present on children's Human Figure Drawings (Koppitz scoring). A Spearman rank-order correlation coefficient of .3226 was obtained. Testing this value using the formula $t=p\sqrt{n-2/1-p^2}$ yielded an observed value of 1.8033. The null hypothesis was rejected for the observed value of t was greater than the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. This relationship was significant at the $p < .05$ level.

The relationship beween mothers' responses to the Tennessee Self-Concept Scale (TSCS) and psychologists' assesssment of the children's social/emotional status yielded a Spearman rank-order correlation coefficient of .2410. Testing this value yielded an observed t of 1.3139. The observed value of t was greater than the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. The null hypothesis was again rejected.

The relationship between mothers' responses to the Tennessee Self-Concept Scale and the combined score utilizing the number of emotional indicators present on Human Figure Drawings and the psychologists' assessment yielded a Spearman rank-order correlation coefficient of .4703. Testing this value yielded an observed t of 3.3323 which was significant at the .01 alpha level. The null hypothesis was again rejected. A statistically significant relationship at the .01 level existed between

mothers' responses to the Tennessee Self-Concept Scale and children's actual social/emotional status. The strongest relationship existed between mothers' self-esteem and the combined assessment of children's social/emotional status using the Human Figure Drawing emotional indicators and the psychologists' assesssment.

$H_0$4. There is no relationship between mothers' locus of control and their prematurely born children's locus of control.

This hypothesis was investigated by determining the relationship between mothers' responses to the Adult Nowicki-Strickland Internal-External Control Scale (ANSIE) and their children's responses to the Preschool and Primary Nowicki-Strickland Internal-External Control Scale (PPNSIE). Analysis of this relationship yielded a Spearman rank-order correlation coefficient of .7715. Testing this value using the formula $t=p\sqrt{n-2/1-p^2}$ yielded an observed value of t=6.4164. The observed value of t is greater than the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. Thus, the null hypothesis was rejected. A statistically significant relationship existed between mothers' locus of control and children's locus of control at the .01 level of statistical significance.

$H_0$5. There is no relationship between mothers' locus of control and their prematurely born children's intellectual ability.

This hypothesis was investigated by determining the relationship between mothers' responses to the Adult Nowicki-Strickland Internal-External Control Scale (ANSIE) and their prematurely born children's Stanford-Binet intelligence quotients. Analysis of this relationship yielded a Spearman rank-order correlation coefficient of .5340. Analysis of the relationship between mothers' responses to the Adult Nowicki-Strickland Internal-External Control Scale (ANSIE) and the children's Human Figure Drawing mental ages yielded a Spearman rank-order correlation coefficient of .6928. Testing these values using the formula $t=r\sqrt{n-2/1-r^2}$ yielded observe values of 3.3418 and 5.0830, respectively. In both cases t is greater than the critical value of $t^*_{28,.10}$, where $t^*_{28.10}=1.313$. The observed values exceeded 1.313, thus, the hypothesis was rejected. A statistically significant relationship existed at the .01 level between mothers' locus of control and their children's intellectual ability as assessed both by the Stanford-Binet Intelligence Scale and a Human Figure Drawing.

$H_0$6. There is no relationship between mothers' locus of control and their prematurely born children's social/emotional status.

This hypothesis was investigated by determining the relationships between mothers' locus of control and their

prematurely born children's social/emotional variables. Spearman rank-order correlation coefficients were obtained for the relationships between mothers' responses on the Adult Nowicki-Strickland Internal-External Control Scale and their prematurely born children's number of Human Figure Drawing emotional indicators, a psychologists' assessment of social/emotional status, and the combined score. These correlations were .6886, .5974, and.7402, respectively. Each correlation was tested using the formula $t=p\sqrt{n-2/1-p^2}$. For the relationship between mothers' locus of control and Human Figure Drawing emotional indicators, t equaled 5.0174. For the relationship between mothers' locus of control and the psychologists' assessment of children's social/emotional abilities, t equaled 3.9415. Finally, for the relationship between mothers' locus of control and the combined score representing children's social/emotional abilities, t equaled 5.244. In each case, the observed value of t exceeded the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. Therefore, the null hypothesis was rejected. A statistically significant relationship existed between mothers' locus of control and children's social/emotional status at the .01 level.

$H_0 7$. There is no relationship between mothers' perceptions of their children's intellectual ability and

their prematurely born children's actual intellectual ability.

This hypothesis was investigated by determining the relationships between mothers' responses to the Parent Perception Profile-Perceptions of Intellect Domain and their children's Stanford-Binet intelligence quotients and Human Figure Drawing mental ages. Pearson product-moment correlation coefficients are reported for past, present, future, and total perceptions of intellect with Stanford-Binet IQs and Human Figure Drawing mental ages in Table 4-5.

Table 4-5

Correlations Between Mothers' Perceptions of Children's Intellectual Ability and Actual Intellectual Ability

	Mothers' Perceptions			
	Past	Present	Future	Total
Stanford-Binet IQ	.2684*	.4517***	.3959**	.2134
Human Figure Drawing-Mental Age	.2056	.3215**	.3301**	.1084

$*p<.10$, $**p<.05$, $***p<.01$

These correlation coefficients were tested using the formula $t=r\sqrt{n-2/1-r^2}$. As can be seen in Table 4-5, the correlations represented differing levels of significance. However, most relationships were significant at the .01

level. A statistically significant relationship existed between mothers' past, present, and future perceptions of their children's intellectual ability and the children's actual Stanford-Binet IQs at the .10 level of significance. In each case the observed value of t exceeded the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. Mothers' perceptions of present and future intellectual ability were significantly related to their children's Human Figure Drawing-mental ages at the .05 level of significance. The null hypothesis was rejected.

$H_0$8. There is no relationship between mothers' perceptions of their children's intellectual ability and their prematurely born children's social/emotional status.

This hypothesis was investigated by determining the relationship between mother's responses to the Parent Perception Profile-Perceptions of Intellect Domain and the number of their prematurely born children's Human Figure Drawing-Emotional Indicators (Koppitz scoring), the social/emotional psychologiocal assessment, and the combined social/emotional assessment. Spearman rank-order correlation coefficients are reported in Table 4-6 for mothers' past, present, future, and total perceptions of intellect and Human Figure Drawing-Emotional Indicators, social/emotional assessment, and the combined score.

Table 4-6

Correlations Between Mothers' Perceptions of Children's Intellectual Ability and Actual Social/Emotional Status

	Mothers' Perceptions			
	Past	Present	Future	Total
Human Figure Drawing-Emotional Indicators	-.3711**	-.5191***	-.5418***	-.5825***
Social/Emotional Assesssment	-.3093**	-.4279***	-.4546***	-.4962***
Combined score (HFD-EI + S/E)	-.5073***	-.6041***	-.6250***	-.6635***

p*<.10,*p*<.05,****p*<.01
Note: Negative numbers represent the inverse correlations between emotional indicators and mothers' perceptions.

These results indicated that mothers' perceptions of their children's intellectual ability were statistically significantly related to their children's actual social/emotional status as assessed via Human Figure Drawings, a psychologists' assessment, and a combined score. Most correlations were significantly different from zero at the .01 level of significance. Therefore, the null hypothesis was rejected.

$H_0$9. There is no relationship between mothers' perceptions of their children's social/emotional status

and their prematurely born children's intellectual ability.

This hypothesis was investigated by determining the relationships between mothers' responses to the Parent Perception Profile-Perceptions of Children's Social/Emotional Status Domain and their children's Stanford-Binet intelligence quotients and Human Figure Drawing mental ages. Pearson product-moment correlation coefficents are reported in Table 4-7 for past, present, future, and total perceptions of social/emotional status, Stanford-Binet IQs, and Human Figure Drawing mental ages.

Table 4-7

Correlations Between Mothers' Perceptions of Children's Social/Emotional Status and Actual Intellectual Ability

	Mothers' Perceptions			
	Past	Present	Future	Total
Stanford-Binet IQ	.2104	.3350**	.3151**	.3705**
Human Figure Drawing-Mental Age	-.1402	.2962*	.1327	.1114

*p<.10,**p<.05,***p<.01

Statistically significant relationships ($p < .05$) were noted for mothers' perceptions of present, future, and total social/emotional status and Stanford-Binet intelligence quotients. Perceptions of present

social/emotional status and Human Figure Drawing mental ages also were significantly related ($p < .10$). Overall, mothers' perceptions of social/emotional status were more strongly related with Stanford-Binet IQs than with Human Figure Drawing mental ages. The null hypothesis was rejected, however, it is interesting to note that mothers' perceptions of prematurely born children's past social/emotional capabilities are not significantly related to present IQ scores or mental ages.

$H_0$10. There is no relationship between mothers' perceptions of their children's social/emotional status and their prematurely born children's actual social/emotional status.

This hypothesis was investigated by determining the relationships between mothers' responses to the Parent Perception Profile-Perceptions of Child's Social/Emotional Status Domain and the number of their prematurely born children's emotional indicators present in Human Figure Drawings (Koppitz scoring), the social/emotional psychological assessment, and the combined social/emotional score. Spearman rank-order correlation coefficients are reported in Table 4-8 for mothers' past, present, future, and total perceptions of the children's social/emotional status and the children's Human Figure Drawing emotional indicators, social/emotional

psychological assessment, and the combined score in Table 4-8.

Table 4-8

Correlations Between Mothers' Perceptions of Children's Social/Emotional Status and Actual Social/Emotional Status

	Mothers' Perceptions			
	Past	Present	Future	Total
Human Figure Drawing-Emotional Indicators	.7789***	.6864***	.6352***	.6274***
Social/Emotional Assessment made by Psychologist	.7309***	.6243***	.5751***	.5769***
Combined HFD and S/E Status	.8408***	.7500***	.7103***	.7209***

*$p<.10$, **$p<.05$, ***$p<.01$

In each of the above cases, mothers' perceptions of their children's social/emotional status were significantly ($p < .01$) related to their children's actual social/emotional status as assessed by the Human Figure Drawing emotional indicators, psychologists' assessments, and combined scores. In each case, the observed value of t exceeded the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. In fact, all the relationships were

statistically significant at the .01 level. Therefore, the null hypothesis was rejected.

$H_0$11. There is no relationship between mothers' income level and their prematurely born children's intellectual ability.

This hypothesis was investigated by determining the relationship between mothers' income at the most recent developmental evaluation and the children's Stanford-Binet intelligence quotients and Human Figure Drawing mental ages. A Spearman rank-order correlation coefficient of -.0800 was obtained for the relationship between mothers' income and children's Stanford-Binet IQs. This relationship was not statistically significant ($p < .10$). The relationship between mothers' income and children's Human Figure Drawing mental ages was described by the Spearman rank-order correlation coefficient of .2964. The observed value of t (1.642) exceeded the critical value of $t^*_{28,.10}$, where $t^*_{28,.10}=1.313$. This relationship was significant at the .10 level of statistical significance. It was concluded that no significant relationship existed between mothers' income and child Stanford-Binet IQ. However, a significant relationship did exist at the .10 level between income and human figure drawing mental age.

$H_0$12. There is no relationship between mothers' income level and their prematurely born children's social/emotional status.

This hypothesis was investigated by determining the relationship between mothers' income at the most recent developmental evaluation and the number of children's emotional indicators present in their Human Figure Drawings, the social/emotional psychological assessment, and the combined social/emotional score. A Spearman rank-order correlation coefficient of -.9596 was obtained for the relationship between mothers' income and the number of emotional indicators present on Human Figure Drawings. A Spearman rank-order correlation coefficient of -.9667 was obtained for the relationship between income and the social/emotional assessments made by the psychologists. A Spearman rank-order correlation coefficient of -.9191 was obtained for the relationship between income and the combined social/emotional assessment. These correlations were tested using the formula $t=p\sqrt{n-2/1-p^2}$. The observed t values of 18.0428, 19.9871, and 12.3411 exceeded the critical $t^*_{28,.10}=1.313$. The null hypothesis was rejected. A statistically significant ($p < .01$) relationship existed between income and social/emotional status.

A summary of all Pearson product-moment correlation coefficients computed is presented in Table 4-9. A summary of all Spearman rank-order correlation coefficients computed is presented in Table 4-10.

Table 4-9

Summary Table of Pearson
Product-Moment Correlations

	ANSIE	TSCS	POI-PA	POI-PR	POI-FU
ANSIE	1.0000				
TSCS	.3057*	1.0000			
POI-PA	.1704	.0967	1.0000		
POI-PR	.1616	.1272	.4430***	1.0000	
POI-FU	.1391	-.0443	.4388***	.9028***	1.0000
POI-TO	.1488	.1811	.5405***	.7134***	.7306***
POSE-PA	.1597	.1260	.2553*	.1855	.0776
POSE-PR	.0018	.1517	.2003	.6434***	.4783***
POSE-FU	.0609	.2715*	.2840*	.7661***	.6722***
POSE-TO	.1028	.2127	.3287**	.6800***	.5277***
RISK	.2855*	.2822*	.3084**	.2831*	.2233
PPNSIE	.0972	.0566	.0048	.0325	-.0251
PSCI	.2395	-.0956	-.2231	.0016	-.1159
IQ	.3807**	.0542	.2684*	.4517***	.3959**
HFD-MA	.1645	-.0349	.2056	.3215**	.3301**

*$p < .10$, **$p < .05$, ***$p < .01$

Table 4-9 (Continued)

	POI-TO	POSE-PA	POSE-PR	POSE-FU	POSE-TO
POI-TO	1.0000				
POSE-PA	.0624	1.0000			
POSE-PR	.3461**	.2458*	1.0000		
POSE-FU	.5349***	.1849	.6434***	1.0000	
POSE-TO	.4003**	.6825***	.7997***	.7767***	1.0000
RISK	.2785*	.1910	.0102	.1989	.1843
PPNSIE	-.0199	-.1880	-.0493	.0067	-.1197
PSCI	-.2186	.0393	.2384	.0128	.1294
IQ	.2134	.2104	.3350**	.3151**	.3705**
HFD-MA	.1084	-.1402	.2962*	.1327	.1114

*p<.10,**p<.05,***p<.01

Table 4-9 (Continued)

	RISK	PPNSIE	PSCI	IQ	HFD-MA
RISK	1.0000				
PPNSIE	-.2827*	1.0000			
PSCI	-.2434*	.2596*	1.0000		
IQ	.1482	-.0197	.2051	1.0000	
HFD-MA	.0797	.0323	.3747**	.5328***	1.0000

*p<.10,**p<.05,***p<.01

Table 4-10

Summary Table of Spearman Rank-Order Correlation Coefficients

	HFD-EI	PSY-S/E	TO-S/E
TSCS	.3226**	.2410*	.4703***
ANSIE	.6886***	.5974***	.7402***
POI-PA	.3711**	.3093**	.5073***
POI-PR	.5191***	.4279***	.6041***
POI-FU	.5418***	.4546***	.6250***
POI-TO	.5825***	.4962***	.6635***
POSE-PA	.7789***	.7309***	.8408***
POSE-PR	.6864***	.6243***	.7500***
POSE-FU	.6352***	.5751***	.7103***
POSE-TO	.6274***	.5769***	.7209***
Income	-.9596***	-.9667***	-.9191***

*$p<.10$,**$p<.05$,***$p<.01$

$H_0$13. There is no relationship between the prematurely born child's intellectual ability and maternal variables (race, income level, self-esteem, locus of control, and perceptions of the child's intellectual ability and social/emotional status) when neonatal risk factors are included.

This hypothesis was investigated using a multiple regression model (Madigan & Lawrence, 1983). The following predictor variables were entered: neonatal risk total; race; income; self-esteem (Tennessee Self-Concept Scale); locus of control (Adult Nowicki-Strickland Internal-External Control Scale); mothers' past, present, future, and total perceptions of child's intellect; and past, present, future, and total perceptions of child's social/emotional status. Stanford-Binet intelligence quotients and Human Figure Drawing mental ages were the dependent variables (i.e., child's actual intellectual abilities). No maternal variables significantly predicted Human Figure Drawing mental ages. The regression analysis, using the suggested default values of F to enter=4.0 and F to remove=3.9, indicated that mothers' income and mothers' perceptions of their children's present intellect were the variables that best predicted the children's Stanford-Binet IQs. The ANOVA summary table for the final regression solution is presented in Table 4-11.

Table 4-11

ANOVA Summary Table, Including the Final Regression Solution and Relationships Between Children's Stanford-Binet IQs and Maternal Variables

Source	DF	SS	MS
Regr	2	3698.3762	1849.1881
Residual	27	6425.0901	237.9663
Total	29	10123.4664	

$\underline{F}(2,27)=7.771$ $\underline{p}=.002$

Multiple correlation=.6044 R squared=.3653

Over 36% of the total variation in the dependent variable was explained by mothers' income and mothers' perceptions of the children's present intellectual ability. This yielded a final prediction equation of $Y=B+5.05596X_1+.8847X_2$, with X_1 representing the independent variable income and X_2 representing the independent variable Perceptions of Intellect-Present. Because the maternal variables income and perceptions of children's present intellectual abilities significantly predicted ($p < .10$) children's Stanford-Binet IQs, the null hypothesis was rejected.

$H_0$14. There is no relationship between the prematurely born child's social/emotional status and the maternal variables of race, income level, self-esteem, locus of

control, perceptions of the child's intellectual and social/emotional status, past, present, future, and total when neonatal risk factors are included.

This hypothesis was also investigated using a stepwise multiple regression model (Madigan & Lawrence, 1983). The following predictor variables were entered: neonatal risk total; race; income; self-esteem; locus of control; mothers' perceptions of their children's past, present, future, and total intellect; and perceptions of their children's past, present, future, and total social/emotional status. Number of Human Figure Drawing emotional indicators was the dependent variable (i.e., child's social/emotional status). The analysis indicated mothers' perceptions of children's social/emotional status-future (POSE-FU) as the variable that best predicted child social/emotional status when the dependent variable was number of human figure drawing emotional indicators. The ANOVA Summary table for the final regression solution is presented in Table 4-12.

Table 4-12

ANOVA Summary Table, Including the Final Regression Solution and Relationships Between Children's Social/Emotional Status (HFD-EI) and Maternal Variables

Source	DF	SS	MS
Regr	1	25.4575	25.4575
Residual	28	65.7425	2.3479
Total	29		

$\underline{F}(1,28)=10.842$ $\underline{p}=.003$

Multiple Correlation=.5283 R squared=.2791

Over 27% of the total variation in the dependent variable was explained by mothers' perceptions of children's future social/emotional status. The prediction equation computed for the prediction of children's social/emotional status was $Y=B-.174423X_1$, with X_1 representing mothers' perceptions of children's future social/emotional status.

Prediction of children's social/emotional status was further investigated by considering outcome as the psychologists' assessment of children's social/emotional status. The ANOVA summary table for the final regression solution is presented in Table 4-13.

Table 4-13

ANOVA Summary Table Including the Final Regression Solution and Relationships Between Children's Social/Emotional Status (PSY-S/E) and Maternal Variables

Source	DF	SS	MS
Regr	1	13.2511	13.2511
Resid	28	42.2155	1.5077
Total	29	55.4667	

$F(1,28)=8.789$ $p=.006$

Multiple Correlation=.4888 R squared=.2389

Over 23% of the variation in this dependent variable was explained by mothers' perceptions of children's future intellectual ability. The prediction equation $Y=B-.0790X_1$ described this relationship.

Finally, the predictive relationship for the outcome variable of the combined assessment of the children's social/emotional abilities was conducted. The ANOVA summary Table for the final regression solution is presented in Table 4-14.

Table 4-14

ANOVA Summary Table, Including the Final Regression Solution and Relationships Between Children's Social/Emotional Status (TO-S/E) and Maternal Variables

Source	DF	SS	MS
Regr	1	56.9359	56.9359
Resid	28	118.5307	4.2332
Total	29	175.4667	

$\underline{F}$ (1,28)=13.450 $\underline{p}$=.001

Multiple Correlation=.5696   R squared=.3245

Over 32% of the variance in children's social/emotional status as defined by number of human figure drawing emotional indicators and a psychologist's assessment of the child's social/emotional assessment was explained by the POI-FU variable. The prediction equation $Y=B-.1819X_1$, with X_1 representing mothers' perceptions of children's intelligence-future best described the prediction of children's social/emotional status (HFD-EI+To-S/E).

Because there existed significant relationships between the children's social/emotional status and the maternal variables POSE-FU and POI-FU, the null hypothesis was rejected.

CHAPTER V
DISCUSSION AND CONCLUSIONS

Investigated were the relationships among maternal variables and the intellectual ability and social/emotional status of children who were born prematurely and at very low birthweight. Maternal variables addressed included self-esteem, locus of control, mothers' perceptions of children's intellectual ability (past, present, future, and total), and mothers' perceptions of children's social/emotional status (past, present, future, and total). In addition, the relationships between neonatal risk factors, race, and income and the children's intellectual ability and social/emotional status were considered. The relationships beween maternal and child self-esteem and locus of control also were studied.

Thirty children who were born weighing less than 1500 grams between January 1, 1979, and December 31, 1980, and their mothers were studied. Eleven male and 19 female children participated. Sixteen of the families were white and 14 were black.

Testing was conducted in the mothers' homes. Mothers responded to the Tennessee Self-Concept Scale,

the Adult Nowicki-Strickland Internal-External Control Scale, and a Parent Perception Profile designed by this researcher. Children completed a Human Figure Drawing, the Primary Self-Concept Inventory, and the Preschool and Primary Nowicki-Strickland Internal-External Scale. Medical and developmental records were consulted for children's medical risk factors, Stanford-Binet IQ scores, income, and psychologists' assessment of social/emotional status.

Descriptive statistics, including means, medians, modes, and standard deviations, were computed. Pearson product-moment and Spearman rank-order correlation coefficients were computed to describe the relationships among the variables. Regression analyses were used to determine predictive relationships.

Discussion

The major limitation to the type of research approach used in this study is that it did not provide the safeguards of experimental research that allow causal inferences to be made. However, this method did allow conclusions regarding relationships and it is appropriate to the type of questions considered in this study.

Also limiting was the fact that it was difficult to contact many of the eligible families of very low birthweight, prematurely born children. Many families

had lost contact with the clinic since 1979 and 1980. Therefore, some self-selection bias was uncontrolled. However, every attempt was made to contact the initial randomly selected group of subjects. The resultant sample did have many of the characteristics common to a nationwide population of VLBW, prematurely born children.

Significant relationships were noted between mothers' locus of control and their children's locus of control. Surprisingly, this was not true for self-esteem. That is, no significant ($p < .10$) relationship was noted between mothers' self-esteem and their children's self-esteem.

Variables that correlated significantly ($p < .10$) with children's intellectual ability included maternal locus of control, income, maternal perceptions of children's intellectual abilities (past, present, and future), and maternal perceptions of children's social/emotional status (past, present, future, and total). Regression analyses also indicated that when considering groups of maternal variables, maternal income and maternal perceptions of children's intellectual ability in the present contributed significantly ($p < .10$) to the prediction of very low birthweight, prematurely born children's IQs. This is consistent with previous findings that income

significantly predicts intellectual outcome. It was interesting to note, however, that neonatal risk factors did not correlate significantly ($p < .10$) with children's intellectual ability.

Variables that correlated significantly with children's social/emotional status included mothers' self-esteem, locus of control, perceptions of children's intellectual ability (past, present, future, and total), perceptions of children's social/emotional status (past, present, future, and total), and income.

Regression analyses also indicated that when considering groups of maternal variables, mothers' perceptions of children's future social/emotional status and mothers' perceptions of children's future intellectual ability contributed significantly ($p < .10$) to the prediction of very low birthweight, prematurely born children's social/emotional status. Again, neonatal risk factors did not show a significant relationship with actual social/emotional status.

Many significant relationships were found among mothers' perceptions and child outcomes in this study. For example, mothers' perceptions of their children's intellectual ability were strongly related with their children's actual intellectual ability. Strong relationships also were noted among mothers' perceptions of their children's social/emotional status and their

children's actual social/emotional status. It appeared that mothers were excellent judges of their children's abilities and characteristics, that children generally "lived up" to their mothers' thoughts and expectations, or that mothers adjusted their expectations to fit their children's abilities, or some combination of the above. In any case, there was agreement between the perceived characteristics and the actual characteristics.

Relationships between mothers' perceptions of past intellectual ability and actual intellectual outcomes were weak, although present perceptions were significantly related to actual status. The data indicated that mothers' perceptions of present intellectual ability have changed positively as compared to mothers' perceptions of past intellectual ability. This is likely due to the fact that the children in this study survived very low birthweight, premature births, the outcomes of which were difficult to predict. Further, mothers' perceptions of their children's social/emotional status were similar for both the past and present subscales of the Parent Perception Profile. Expectations for children's intellectual status at the time of a traumatic birth may have been more impaired than expectations for social/emotional status. In fact, the mean scores for social/emotional perceptions were slightly lower for the present than the past.

Conclusions and Implications for Future Study

A primary conclusion from this study with significant implications for practitioners is that neonatal risk factors alone do not determine VLBW, prematurely born children's intellectual or social/emotional outcomes. That is, neonatal risk factors did not relate significantly to outcomes in this study. It is possible that variables such as mothers' perceptions that do relate to child outcomes may play a part in actually determining child outcomes. If so, significant training implications are evident. For example, attention should be paid to helping mothers raise expectations for their children to optimal levels.

Another implication of this study involves the conclusion that mothers are generally accurate in their perceptions of their children's intellectual abilities and social/emotional status. This information would be useful to school psychologists and other helping professionals as they prepare to discuss test results and observations with parents. Results of this study indicate that mothers are aware of their children's present abilities. Also, results of this study support the incorporation of a "parent report" into any comprehensive student assessment. Gaining information about parent perceptions of their children's abilities in the past, present, and future will help professionals

to gain greater insights into the child's present, and thereby assist professionals in providing useful intervention and guidance.

Additional research based on parental perceptions and prediction of outcome for prematurely born children seems essential as medical science approaches the fourth phase of more accurate prediction of outcome described by Stewart, Reynold, and Lipscomb (1981). This is particularly true where ethical issues, such as quality of life, are concerned. The reciprocity of the influence of parental perceptions on premature child development must be carefully studied, with larger samples, and in studies designed to determine causality rather than relationship.

APPENDIX A
PARENT PERCEPTION PROFILE
by

Linda K. Morrin

Respond to each question by choosing the answer that best describes your feelings.
Very True, Somewhat True, Neither True Nor False, Somewhat False, Very False

---

I. Family life - Past

1. When my baby was first born, I thought s/he was just what a baby should be.
2. My baby's birth was very expensive.
3. When my baby was first born, I was jealous of other mothers' babies.
4. My baby's birth made me very proud.
5. I felt as though I was being punished for something when this baby was first born.
6. I loved my child from the first day s/he was born.
7. I would never tell anyone this, but I secretly wished for my baby's death when s/he was first born.
8. My baby's birth was very hard on my family and me in the beginning.
9. My family became closer when my child was first born.
10. I got along better with my baby's father when this child was first born.

II. Family life - Present

1. Now my child is just what I hoped s/he would be.
2. My child has made my life more complete.
3. I resent the high cost of caring for my child.
4. Life is harder now that my child is older.
5. My child is doing even better than I thought s/he would at birth.

6. I am more worried about my child than other mothers are about theirs.
7. This child requires more time than other family members.
8. My child has put many strains on the family.
9. My child is the best thing that has ever happened to my family.
10. I am pleased with my family life in general.

III. Family life - Future

1. I can see that my child will grow up to make me very proud.
2. My child will always require special care.
3. My child will be a source of comfort to me when I grow old.
4. I worry about what will happen to my child when I die and s/he is grown.
5. I worry that my child will always require financial assistance.
6. My child will continue to add to my family life.
7. I am frightened when I think of my child's future.
8. My family life will get better when my child grows up.
9. My child will always be a special part of the family.
10. My family will always have special problems because of this child.

IV. Child's Cognitive Abilities - Past

1. When my child was born I didn't think s/he would be as smart as other children.
2. My child generally learned new things when I thought s/he should.
3. My baby was always curious.
4. I thought other people didn't think my baby was very smart.
5. When my child was first born, I was scared that s/he would not learn to do things other children could do.
6. My baby seemed to understand as well as other babies.
7. My baby didn't learn to do things quickly.
8. Other people often told me how intelligent my baby was.

9. When my baby was first born, I was afraid s/he would be slower than most other children.
10. I always thought my baby was as bright as any baby.

V. Child's Cognitive Abilities - Present

1. Now that my child is older, I can see that all my teaching has paid off.
2. My child isn't keeping up with other children.
3. My child is not as bright as I thought s/he would be.
4. My child is as smart as I want him/her to be.
5. It takes my child longer to learn things than other children.
6. My child enjoys learning new things.
7. I have to work very hard to teach my child new things.
8. My child gets frustrated when s/he tries to learn new things.
9. My child learns fast.
10. My child has a lot of common sense.

VI. Child's Cognitive Abilities - Future

1. My child will be smart enough to go to college someday.
2. My child will have no trouble learning anything s/he needs to in life.
3. My child will probably require special help to learn new things.
4. Others will always think my child is intelligent.
5. I don't worry about my child's future because my child is smart.
6. Compared to other children, my child will have difficulty in school or at work.
7. Learning new things will be harder for my child than for others.
8. I'm sure my child can do whatever s/he sets his/her mind to do.
9. Teachers and/or employers will think my child is slow when s/he grows up.
10. My child will never learn as fast as others.

VII. Child's Physical Abilities - Past

1. My child was not very pretty when s/he was first born.
2. My child was not as strong as others when s/he was first born.
3. I imagined my child as being athletic when s/he was first born.
4. I didn't worry about my child's health when I took him/her to the doctor for regular check ups.
5. My baby didn't learn to walk as fast as most other babies.
6. My baby was big enough to get into things before I knew it.
7. My baby was active (but not too active).
8. My baby didn't learn to do physical things as early as most other babies.
9. My child was always smaller than other children his/her age.
10. People often told me how pretty my baby was.

VIII. Child's Physical Abilities - Present

1. My child looks like an average child his/her age.
2. My child is clumsy.
3. I like the way my child looks.
4. My child is afraid to do physical things.
5. My child is always on the move!
6. My child is very coordinated.
7. My child may not be as athletic as other children his/her age.
8. My child is sick a lot.
9. I worry about my child's health.
10. It's hard to believe how much my child has grown.

IX. Child's Physical Abilities - Future

1. I sometimes imagine that my child will grow as big or bigger than I am.
2. I see my child as having developed physically as fast or faster than other children.
3. It will always be hard for my child to do physical things that others do.
4. I will probably always have to help my child do some physical things.

5. My child will live a long and healthy life.
6. My child may never be as good at sports as I am.
7. When my child grows up, s/he will enjoy good physical health.
8. My child may not ever have the physical abilities that I do.
9. My child may not grow up to be as coordinated as most others.
10. I imagine my child to be good looking as an adult.

X. Child's Social/emotional abilities - Past

1. When my child was very young, s/he cooed and talked a lot.
2. My child smiled a lot when s/he was a baby.
3. Sometimes, when my child was very young, I felt it was hard to like him/her.
4. When my baby was very young, s/he cried more than other babies.
5. It was fun to play with my baby when she was very young.
6. My baby was very irritable.
7. When my baby was very young, s/he usually liked new people.
8. My baby was fussier than most babies.
9. When my baby was very young, s/he showed me s/he liked me.
10. My baby didn't like to play like other babies.

XI. Child's Social/emotional Abilities - Present

1. Now my child is fun to play with.
2. My child has many friends.
3. My child sometimes seems shy and afraid.
4. My child is hard to get along with sometimes.
5. Other children like my child.
6. My child is like all other children his/her age.
7. My child gets into a lot of fights.
8. My child smiles and laughs at funny things.
9. My child throws a lot of temper tantrums.
10. I secretly don't like my child.

XII. Child's Social/emotional Abilities - Future

1. When my child grows up, I expect s/he will be well-liked.
2. My child will be a social success when s/he is older.
3. My child will have difficulty in social situations when s/he is older.
4. It will be difficult for my child to fit in.
5. My child will have difficulty adjusting in life.
6. I see my child married someday.
7. My child will make a good parent someday.
8. My child will have difficulty making new friends.
9. My child will grow up to be very caring.
10. My child will always be a little difficult to understand.

APPENDIX B
INFORMED CONSENT FORM

Dear Parent:

My name is Linda Morrin. I am a student in the Counselor Education Department at the University of Florida and I would like to ask your permission and your child's permission to participate in a research study. The project title is: The Relationships Among Maternal Variables and the Intellectual and Social/Emotional Status of Prematurely Born Children.

The primary aim of this study is to investigate the status of mothers and their prematurely born five, six, or seven year old children who were placed in the Neonatal Intensive Care Unit (NICU) at birth. Maternal self-esteem, locus of control, and maternal perceptions of their children's intellectual and social/emotional abilities, as well as child self-esteem, locus of control, intellectual abilities, and social/emotional status will be studied. Relationships between maternal and child variables will be investigated.

To participate in the study you will need to:

1. Complete the Tennessee Self-Concept Scale
2. Complete the Adult Nowicki-Strickland Internal-External Control Scale
3. Complete the Parent Perception Profile
4. Give permission for medical and developmental records to be consulted.

Your child will need to:

1. Complete the Preschool and Primary Nowicki-Strickland Internal-External Control Scale
2. Complete a Human Figure Drawing
3. Complete the Primary Self-Concept Inventory
4. Complete the Stanford-Binet Intelligence Scale if this is not on file with Children's Developmental Services in Gainesville, FL.

The study will take approximately 45 minutes of your time and approximately 15-20 minutes of your

child's time if the Stanford-Binet score is on file. The Stanford-Binet takes approximately 45-60 minutes.

Participant ________________________________

Address ________________________________

____

Phone Number ________________________________

The above stated nature and purpose of the research, including discomforts and risks involved (if any) have been explained to me. Any future questions I may have will be answered by the researcher. The researcher can be contacted by phone at (813) 985-0926 or (813) 272-4576 and by mail at 334 Fern Cliff Avenue, Temple Terrace, Florida 33617. Furthermore, I understand that this investigation may be used for educational purposes which may include publication. If used for publication, participants' names will not be used. I also understand that my child and/or I may withdraw consent at any time without prejudice.

I agree to participate in the research as described above. I agree to allow my child ____________________ to participate in the study.

This information will be kept confidential within legal limits (or to the extent provided by law).

Parent ________________________ Date ______________

2nd parent/witness ______________ Date ______________

I have defined and explained fully this research to the participant whose signature appears above.

Researcher ______________________ Date ____________

APPENDIX C
CHILDREN'S VERBAL CONSENT

My name is Linda. I am going to be asking you to draw some things and I am going to be asking you and your mother some questions. Do you want to do this? If you want to stop just tell me and we'll stop.

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BIOGRAPHICAL SKETCH

Linda Katherine Morrin was born on December 22, 1956, in Hamilton, New York. She is the oldest of two girls born to Priscilla Hubbell Morrin and retired Lt. Col. Richard Bruce Morrin, USAF. She has a younger sister, Alicia Carol Morrin, of DeLand, Florida.

Linda attended public schools in Massachusetts, New Hampshire, Louisiana, California, Alabama, Florida, and Zaire. She attended Mount Holyoke College, l'Université de Neuchâtel, Stetson University, and El Instituto Cultural Mexicano Norteamericano. In 1977 she graduated with her Bachelor of Arts in French and Spanish from Stetson University. In 1981 she began graduate school at the University of Florida, Gainesville, where she taught English as a Second Language to graduate and undergraduate students, was a Title VII Bilingual Bicultural Teacher Training Fellow, and, in 1983, earned her Specialist in Education degree in curriculum and instruction. She simultaneously completed the requirements for the Specialist in Education degree in school psychology and continued her study of Spanish at La Universiad de Los Andes in Bogotá, Colombia.

Linda completed her school psychology internship in the Volusia County, Florida, schools under the supervision of Margaret Jones and Dr. David Mealor. She was simultaneously employed as an adjunct faculty member at Daytona Beach Community College. She subsequently worked as a school psychologist for the Regional Developmental Evaluation Clinic, Children's Developmental Services, of the Department of Pediatrics, University of Florida College of Medicine. She is currently employed as a school psychologist with the Hillsborough County, Florida, public schools.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosphy.

Paul J. Wittmer

Dr. Paul J. Wittmer, Chairman
Professor of Counselor Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Larry C Loesch

Dr. Larry C. Loesch
Professor of Counselor Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosphy.

Clemens L. Hallman

Dr. Clemens L. Hallman
Professor of Instruction and Curriculum

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosphy.

Michael B. Resnick

Dr. Michael B. Resnick
Assistant Professor of Pediatrics

This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

May, 1987

David C. Smith

Dean, College of Education

Dean, Graduate School